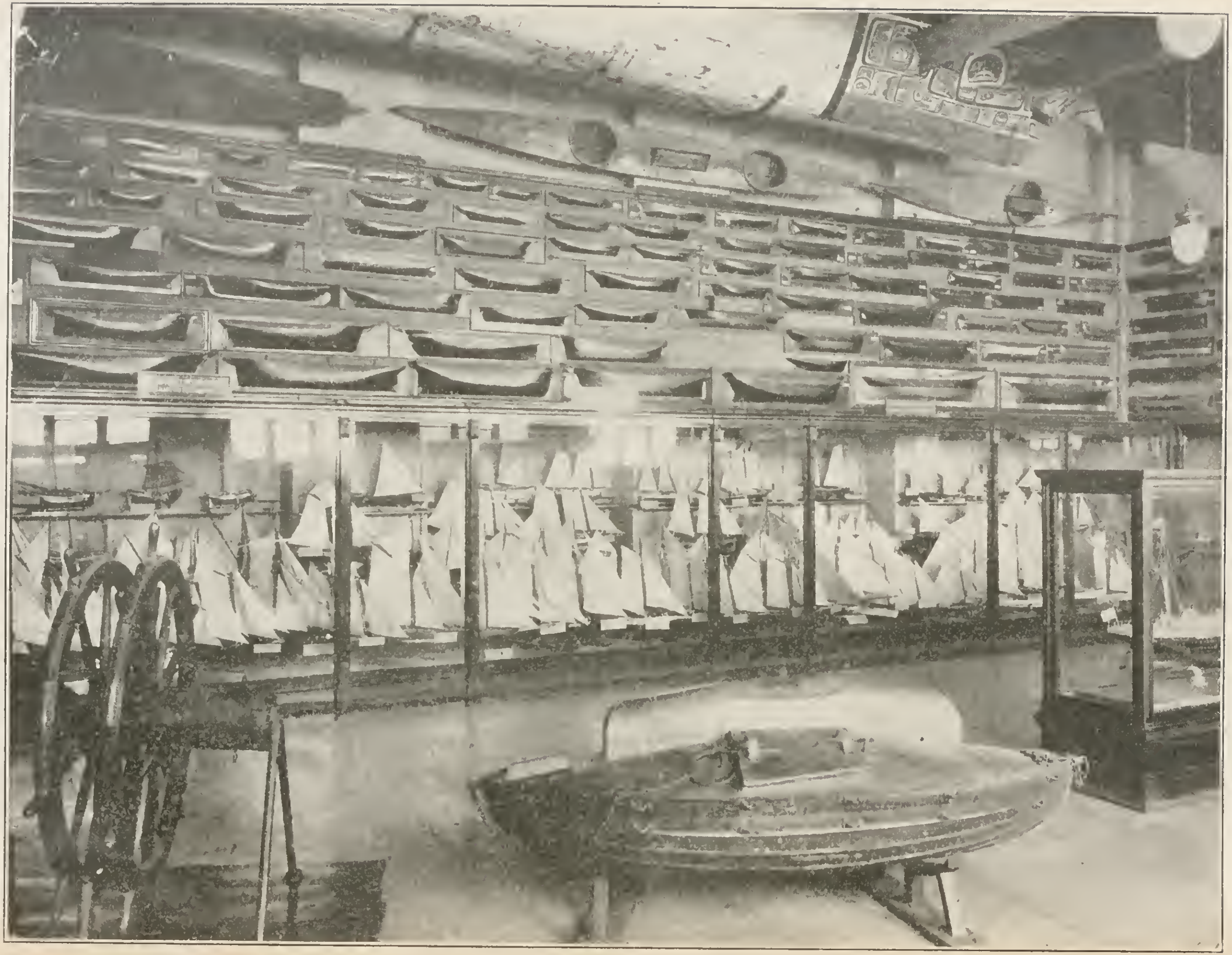
FOR·THE·INCREASE·
·AND·DIFFVSION·OF·
·KNOWLEDGE·AMONG·MEN·
PER
ORBEM
·SMITHSONIAN·
·INSTITVTION·
·WASHINGTON·1846·

SHOUT
SHARE
IT



THE BOAT HALL, UNITED STATES NATIONAL MUSEUM.

SMITHSONIAN INSTITUTION

UNITED STATES NATIONAL MUSEUM

Bulletin 127

CATALOGUE OF THE WATERCRAFT COLLECTION IN THE UNITED STATES NATIONAL MUSEUM

COMPILED AND EDITED BY

CARL W. MITMAN

Curator, Divisions of Mineral and Mechanical Technology

WASHINGTON
GOVERNMENT PRINTING OFFICE
1923

ADVERTISEMENT.

The scientific publications of the United States National Museum consist of two series, the *Proceedings* and the *Bulletins*.

The *Proceedings*, the first volume of which was issued in 1878, are intended primarily as a medium for the publication of original and usually brief, papers based on the collections of the National Museum, presenting newly acquired facts in zoology, geology, and anthropology, including descriptions of new forms of animals and revisions of limited groups. One or two volumes are issued annually and distributed to libraries and scientific organizations. A limited number of copies of each paper, in pamphlet form, is distributed to specialists and others interested in the different subjects as soon as printed. The date of publication is recorded in the table of contents of the volume.

The *Bulletins*, the first of which was issued in 1875, consist of a series of separate publications comprising chiefly monographs of large zoological groups and other general systematic treatises (occasionally in several volumes), faunal works, reports of expeditions, and catalogues of type-specimens, special collections, etc. The majority of the volumes are octavos, but a quarto size has been adopted in a few instances in which large plates were regarded as indispensable.

Since 1902 a series of octavo volumes containing papers relating to the botanical collections of the Museum, and known as the *Contributions from the National Herbarium*, has been published as bulletins.

The present work forms No. 127 of the *Bulletin series.*

William deC. Ravenel,
Administrative Assistant to the Secretary,
In charge of the United States National Museum.

Washington, D. C., June 9, 1923.

TABLE OF CONTENTS.

	Page.
Introduction	1
Scope of the collection	4
Part 1. Description of vessels and boats of North America	41
Government vessels of the United States	41
Merchant vessels	47
Steamers	47
Sailing vessels	69
River craft	102
Pilot boats	104
Yachts and pleasure boats	106
Steam yachts	106
Sailing yachts	108
Pleasure boats	113
Fishing vessels	115
Steamers	115
Sailing vessels	120
Fishing boats	185
Skin boats	206
Birch-bark canoes	214
Balsas and dugouts	217
Part 2. Description of vessels and boats of South America	222
Part 3. Description of vessels and boats of Europe	225
Part 4, Description of vessels and boats of Asia and Africa	246
Part 5. Description of vessels and boats of Pacific islands	285
Glossary	291
Index	293

LIST OF ILLUSTRATIONS.

The boat hall, United States National Museum ---- Frontispiece.

TEXT FIGURES.

	Page.
1. Sail plan of modern two-masted schooner	25
2. Sail plans of the more common types of small sailing vessels	32
3. United States Bureau of Fisheries steamer "Albatross"	43
4. United States Bureau of Fisheries schooner "Grampus"	46
5. James Rumsey's steamboat	48
6. John Fitch's steamboat	49
7. John Stevens' twin-screw steamboat	50
8. John Stevens' steamboat boiler and engine	53
9. Robert Fulton's steamboat "Clermont"	59
10. John Stevens' steamboat "Phoenix"	61
11. Steamship "Savannah." First to cross the Atlantic Ocean	63
12. Steamer "R. F. Stockton." First iron hull to cross the Atlantic Ocean	64

Page.
13. Ohio River steamer "Grey Eagle" 65
14. American steam tug "Rattler" 66
15. Twin-screw steamship "Philadelphia" 69
16. Single-screw steamship "Cambrai" 70
17. Spanish fifteenth century sailing vessel 71
18. English seventeenth century sailing vessel 72
19. Ohio River flatboat 102
20. Ohio River keel boat 103
21. American schooner yacht 110
22. American sloop yacht 111
23. Yacht, English type 112
24. Whaling steamer "Orca" 116
25. Seventeenth century "snow" 121
26. Early seventeenth century sailing vessel 122
27. American fishing ketch 126
28. Schooner. Marblehead, Mass 127
29. Chebacco boat "Lion" 129
30. New England fishing "pinky" 130
31. Grand Banks cod fishing schooner "Open Sea" 131
32. Dogbody Chebacco boat 132
33. New England pinky schooner "Tiger" 134
34. New England schooner "D. R. Proctor" 135
35. New England schooner "Elisha Holmes" 137
36. New England schooner "Etta G. Fogg" 139
37. New England schooner "Mary O'Dell" 141
38. New England clipper schooner "Wm. M. Gaffney" 142
39. New England clipper schooner "Spencer F. Baird" 143
40. New England three-masted schooner 144
41. New England schooner "Fredonia" 146
42. New England schooner "Rob Roy" 149
43. New England ketch "Resolute" 150
44. New England smack "Storm King" 151
45. Chesapeake Bay pungy "W. F. McKewen" 153
46. Chesapeake bay schooner 154
47. Chesapeake bay bugeye 155
48. Long Island carry-away sloop 177
49. Boston fishing cutter 180
50. Noank centerboard sloop 181
51. Key West smackee "Jeff Brown" 183
52. New Orleans lugger 184
53. Marthas Vineyard catboat 186
54. No Man's Land boat 191
55. Quoddy fishing boat "Yankee Hero" 193
56. San Francisco felucca 195
57. Atlantic coast sharpie 197
58. North Carolina sharpie 199
59. New England dory 201
60. Chesapeake Bay dugout canoe 204
61. American Indian coracle or "bull boat" 207
62. Alaska skin boat called "oomiak" 211
63. Kootenay Indian spruce bark canoe 215
64. Canadian birch bark canoe 216
65. Tule grass balsa 217

Page.
66. Haida Indian dugout canoe 220
67. Haida Indian dugout canoe 221
68. British Guiana dugout canoe 223
69. Irish "curragh" 225
70. German fishing vessel "Catharina von Nordernei" 228
71. German "kurran kahn" 230
72. Dutch "bombschuite" 231
73. Belgian fishing vessel 232
74. Danish "sound" boat 233
75. Viking ship 236
76. Norwegian "bankskiote" 237
77. Norwegian fishing boat 239
78. Swedish herring boat 242
79. Grecian fishing vessel 245
80. Malay outrigger canoe 249
81. Malay pirate vessel 252
82. Dayak lug-rigged prahu called "bajak" 253
83. Sumatra "lanchang" 254
84. Johore "fast boat" 258
85. "Sampan panjang," Johore, India 261
86. Malacca catamaran 262
87. Bombay "machva" 265
88. Bombay fishing canoe 266
89. Laccadive Islands canoe 269
90. East Indian coracle or "parachal" 273
91. Japanese fishing boat 275
92. Chinese coasting junk 278
93. Chinese river boat 281
94. Samoan outrigger canoe 285
95. Caroline Islands outrigger canoe 287
96. Sail plan of a full-rigged ship 290

CATALOGUE OF THE WATERCRAFT COLLECTION IN THE UNITED STATES NATIONAL MUSEUM.

COMPILED AND EDITED BY

CARL W. MITMAN.

Curator, Divisions of Mineral and Mechanical Technology.

INTRODUCTION.

Few problems with which man has had to deal are of greater consequence to his well being and material development than aquatic transportation. Primitive man had forced upon him the necessity of obtaining food and covering from the animals which inhabit the waters; consequently, one of his earliest efforts was to secure the means of floatation whereby the possibilities of supplying his needs were immeasurably increased.

As progress in civilization developed the requirements of intercourse among peoples separated by gulfs, seas, and oceans led to advancement in naval architecture, while the predatory habits of mankind have wielded no small influence in producing forms of boats and vessels, even among savage or semicivilized tribes, most suitable for easy and swift passage through the water. Thus the demands of commerce, or the requirements of the sea rover, or of nations, in securing means of offense and defense, have resulted in carrying the art of naval architecture to the remarkable efficiency which has been attained in recent years. A comparison of the productions of savage or semicivilized men with the vessels constructed during recent centuries or more remote periods, in accordance with the most advanced ideas of the leading peoples of the earth, affords material for a most interesting study of the progress of the human mind in a particular direction.

It may be accounted as a remarkable fact that there exists to-day, contemporaneously with the floating palaces which cross oceans and almost annihilate space and time, the crudest and most primitive devices for floatation which probably have ever been used by man. Much of this disparity may be accounted for by the influence of environment, or by the varying requirements of individuals and localities. At the same time, as will be mentioned elsewhere, intercourse among nations has tended not only to modify and improve the forms of vessels employed in commerce and war, but has also had more or less influence on the handiwork of savage or semicivilized races. More remarkable than this, perhaps, is the fact that the savage and half-civilized peoples, through long ages of patient experimentation, have often reached correct conclusions regarding the proper form of boats long before equally satisfactory results were attained by the more highly enlightened nations of the globe. It is worthy of note, in this connection, that the boats and vessels of Egypt, built fully 4,000 years ago, embodied in their construction ideas of form which, after many years of the sharpest competition among scientific men during the nineteenth century, were found necessary to produce the swiftest types of sailing vessels.

The Viking ships exhumed in Norway and the boggy marshes of the Baltic Sea coast of Schleswig, and which are supposed to have been buried from 1,000 to 1.500 years ago, were fabrics that, so far as the adaptation of form to a purpose is concerned, have not been excelled in all the centuries that have passed since they were constructed. One can only wonder at the intelligence that produced such shapely and symmetrical vessels in a period of the world's history that has been classed as the dark ages.

But while we may wonder at and admire the creations of early ages of the savage's skill, the fact is impressed upon us that these efforts are only stepping stones; it required the application of scientific knowledge and a combination of the art of the naval constructor with the inventive genius of the creator of a new motive power, the steam engine, to attain that perfection in naval architecture which is the marvel of modern times, and has resulted in producing vessels that realize the poet's dream and literally bid defiance to the elements.

It has become an axiom in political economy that nations which expect to attain greatness in commerce, or to become powerful in war, must in large measure depend upon the sea for success in these particulars. It is a well-known fact that the remarkable early development of America was primarily due to its sea commerce, which not only carried the flag of the new Republic to the remotest corners of the globe, but enhanced the reputation of its merchants and laid a broad foundation for intercourse and trade which has proved of an inestimable advantage to the Nation. In the early history of the country, builders of fishing boats became in time the builders of clipper ships which were without a rival on the seas, while the masters of fishing smacks often became the captains and navigators of stately ships which voyaged to the most distant lands.

It is therefore fitting that in the United States National Museum there should be a tangible record of the development of naval architecture in a country which owes so much of its success and greatness to the art which has created the floating fabrics that have sailed from its shores. It is proper, too, that the products of the skill of the aborigines of this continent, generally suggesting a most interesting application of means to ends, should stand side by side with the more imposing fabrics employed by the white man in commerce. When to these are added collections more or less completely illustrating the condition of naval architecture in other parts of the globe, it will be seen that much has been accomplished in bringing together material for study and which at the same time has a marked importance from an historical standpoint.

While much has been done to increase the collections in certain lines, it should be understod that in no way do they approach a complete representation, but rather form a nucleus around which may be assembled other objects in this field. They are the result of incidents rather than of a well defined and properly sustained effort to make them complete and exhaustive.

Many of the expeditions sent out by the United States, beginning with the Wilkes expedition in 1838–1842, have from time to time brought to the Museum specimens of boats and models of vessels collected in various parts of the world over which the cruises extended. So far as the craft of the aborigines are concerned, many were gathered by a systematic effort, the ultimate object of which was to secure representations of all forms of boats or other means of water transportation used by the natives in various parts of America. Advantage, very properly, was taken of various expositions which had been held in this country, or in which the United States had participated abroad, to add to the collections, and much interesting and valuable material was obtained in this way.

The fact that fishing boats and vessels constituted an important feature of the exhibits displayed by the United States Fish Commission at the various expositions in which it participated at home and in foreign countries, resulted in bringing together, as part of the collection, a series of models, largely prepared under the direction of Capt. Joseph W. Collins, which constitutes a most comprehensive and exhaustive epitome of naval architecture as applied to the fisheries in this country since its settlement. Captain Collins had the opportunity also to add considerably to the collections illustrative of the American merchant marine through the generosity of individuals desirous of preserving in a national institution some tangible historical record of our merchant marine.

Reference should not be omitted of many individuals who have generously contributed or who have improved their opportunities while traveling abroad to make collections.

The collection, as a whole, contains, in addition to models of vessels and full-size boats, many photographs, drawings, and paintings. These latter objects, however, have been omitted in this descriptive catalogue so as to avoid a too cumbersome volume.

SCOPE OF THE COLLECTION.

NORTH AMERICA.

The portion of the collection relating to vessels of the United States, as might naturally be expected is much larger, more comprehensive and varied, than that pertaining to vessels of any other country. There are comparatively few government vessels exhibited. The limited though varied collection, however, embraces some objects of special interest. No well-defined effort has been made to collect material of this kind outside of the vessels of the Bureau of Fisheries, which are fully represented. This may in a measure be due to the fact that the Navy Department has for some years been assembling a series of models or other illustrations pertaining to that phase of naval architecture with which it is specially concerned.

Considered from an historical standpoint the United States occupies a most prominent position in the department of steam navigation, in which it led all other countries. In the illustration of naval architecture as applied to steam navigation the object has been, so far, to give special attention to the representation of historical objects through which can be traced the beginnings of an enterprise destined in later years to revolutionize the water-borne traffic of the world.

The early efforts of American inventors to attain success in building steamboats were conducted under the most discouraging influences, conditions which would have prevented a continuation of labor on the part of men having less inspiration and determination. When the fact is recalled that there was not a properly organized machine shop in the United States at the time when many of the early steamboats were built and engined, we can not but marvel at the results secured. While it is true that Fulton's *Clermont* was equipped with engines made in England, it is equally true that smaller craft, devised before her time by Fitch, Rumsey, and Stevens had their engines built in America, and that the *Phoenix*, built by Stevens the next year after the *Clermont* was afloat, was fitted with a boiler and engine of domestic manufacture—a triumph of American skill and invention which it is difficult at this time to properly appreciate.

The great possibilities for steam traffic in navigating the magnificent rivers, lakes, and sounds of the United States was an incentive which prompted the greatest exertions in developing steam vessels. The success which attended these efforts led Americans to venture the inauguration in 1819 of transatlantic steam travel. While this experiment, undertaken largely for speculative purposes, did not prove remunerative, it, nevertheless, blazed the way for more successful ventures a few years later when the construction of steam vessels and their employment on the ocean were better understood.

No other country, perhaps, has such a variety of steam craft as the United States, due largely to the fact of the varying conditions of its inland and coast waters to which, of course, vessels must be adapted to meet with success. It is not pertinent to discuss here the causes which have influenced or retarded the development of an ocean-going steam merchant fleet under the flag of the United States, such as may have been expected from the prominent part taken by this country in the inauguration of steam navigation. It is probably sufficient to say that, at the present time, this country is able to produce as fine examples of steam vessels as have ever been put afloat in any part of the world, prompting the hope that the day is not far distant when the water-borne commerce of the country may be carried in home-built hulls.

The development of sailing vessels affords a most excellent opportunity for the study of many interesting phases of naval architecture. The student of this art will learn how the form, construction, and rig of vessels have been modified to meet the requirements of trade or certain local environments. At the same time it is instructive to consider the types of vessels contemporaneous with the discovery and early settlements of America, or which were associated with the merchant service in later colonial periods. Necessarily, the vessels last referred to were wholly or largely of European types and build. Nevertheless, they are of special interest as affording the starting point upon which the naval architecture of America was primarily founded.

The changes which have occurred since the establishment of American independence in the intercourse of nations and the methods of conducting maritime commerce are nowhere more strongly emphasized than in the noticeable advance in the size of seagoing vessels. In the early days of the Republic a large percentage of the vessels trading with Europe were small brigs and brigatines ranging from a little more than 100 tons to about 200 tons, old measurement. Even the ships of those early days were comparatively small and at the present time would look like toy vessels beside the great fabrics with lofty rigs that are now fitting representatives of the sailing vessels employed by this country.

The *Atlantic*, built by John Davis, jr., in 1790, and the first full-rigged ship built at Bath, Me., was only 235 tons. No vessel exceeding 500 tons measurement was built at that port until 25 years later, when the *Cleopatra* of 518 tons, which had been three years on the stocks (the delay in building being due to the war between the United States and England), was launched. As early, however, as the beginning of the nineteenth century, a few ships were built in Massachusetts of 500 or 600 tons, but these were exceptional and for many years continued to be among the largest ships afloat.

In 1841 the *Rappahannock* of 1,113 tons was built at Bath, chiefly for the cotton carrying trade. Her great size, however, was to some extent disadvantageous, and it is a matter of historical record that her arrival at New Orleans generally caused a decline in cotton freights.

In the meantime the demands of the passenger traffic between Europe and America had led to the construction of comparatively large, swift sailing ships of which more extended mention will be made elsewhere. These were followed by the great sailing clippers of the "forties" and "fifties" which were unrivaled in the world for size, beauty, and speed.

Although the clipper practically disappeared from the ocean in consequence of the general introduction of steam vessels, and the building of the Pacific Railroad across the American continent, the ships which have been built in recent years have often been as large or larger than those employed in the palmiest days of the sailing packet service. Thus, the *Rappahannock*, built at Bath in 1890, was 3,185 tons register; while the *Shenandoah*, another Bath built ship of more recent date, was still larger.

The most noticeable innovation, however, in the American merchant sailing marine, is the remarkable increase in size of schooner-rigged vessels. In the first half of the nineteenth century, the schooners employed in the merchant service were usually comparatively small, and even those carrying square sails on the foremast and designated as topsail schooners, were often no larger than from 75 to 100 tons, old measurement. In recent years the tendency has been to abolish the use of square sails and to increase the size of schooners to a degree which might not have been anticipated in the wildest dreams of the naval architect of 1850. This, too, has been accompanied by a change in the rig to the extent of adding more masts, with corresponding sails, until seven-masted schooners are not unknown and four-masted schooners with a cargo capacity of from 1,500 to more than 2,000 tons, larger than ordinary sailing ships, are so common in American waters that their appearance no longer provokes remark. As a rule, these are wooden vessels engaged in the coastwise and lake traffic.

It has been said that "the first three-masted schooner built in the United States was the *Magnolia*, built at Blue Hill, Me., by George Stevens and Jere Faulkner for Capt. Daniel Clough, who was her first master. The *Magnolia* was about 100 tons, and her rig was the idea of Captain Clough."[1] The exact date when this vessel was built is not known, but presumbaly she was constructed about 1850.

As soon as three-masted schooners of considerable size were introduced it was found that they could be managed with less men in proportion to their carrying capacity than either two-masted schooners or square-rigged vessels. The result was that this rig was readily adopted, and ultimately, as has been said, still larger vessels were built having one or more additional masts. Two-masted and three-masted schooners are numerously represented in the collection of the Museum, which also has illustrations of a four-masted and a five-masted schooner, the latter being at one time the largest seagoing schooner in the world.

Among the American merchant vessels are two types of special interest, one of which, the so-called "kettle-bottom" vessel, was designed with special reference to carrying capacity on a given tonnage, while the other, the "extreme clipper," was produced for the purpose of securing the highest possible speed attainable by sailing ships.

The "kettle-bottom" vessel in its highest development owes its origin primarily to the cotton trade and to the onerous port charges levied on American vessels in foreign countries, particularly in Europe. These taxes were usually assessed at so much a ton, and in order to escape them so far as practicable, under the tonnage rules of measurement for the United States, it became necessary to build vessels of a peculiar form so that they would have a maximum of carrying capacity on a given tonnage. Therefore, they were made abnormally deep with low flat floors, round full bilge, strongly convex ends, and tumble-in top sides. Among the best examples of this style of naval architecture were the bark *Saone*, built at Bath in 1846, and the brig *Palos*, built at Newbury, Mass., in 1832. Models of these vessels, as well as photographs of brigs built on the model of the *Palos*, are in the collection. Certain merchants favored this form of vessel to a marked degree, prominent among them being John Cushing, of Newbury, whose fleet of square-rigged brigs, mostly built on the model of the *Palos*, attained celebrity not only in the United States but in many other parts of the globe. The fact that one of these vessels, the brig *Keying*, of less than 300 tons burden, carried a cargo of fully 700 tons of coal from Cardiff, Wales, to Jamaica, British West Indies, indicates the extreme to which this type was carried. It is but just to say, however, that such vessels were very slow and clumsy in handling. Consequently, they were in disfavor with some merchants and particularly with sea captains, who preferred swifter and handier vessels for the general purposes of trade.

---

[1] Gloucester Times, Mar. 9, 1889.

"As no roomy ship could ever be loaded down to her deepest draught with so light and fleecy a cargo as cotton, it was customary to stow away bales in every available sheltered space to be found on board, from the limber strake to the main rail, and even the mess table in the cabin was often a bale of cotton. No matter how big the cargo, the ship would not be down in the water to her bearings, and would be top-heavy and crank in consequence; so that it was always necessary to carry from 100 to 300 tons of stone ballast for the sake of stability, and even then the kettle bottoms were apt to go away over on their sides whenever the wind was abeam and stay there, to the discomfort of all on board. The sailor loves to see a good space between the deck he treads and the water upon which he floats; and whatever beauties the owner saw in a kettle bottom that carried a big freight and paid him well, Jack saw none. His preference has always been for a ship that would stand up stiff under sail, and some of the cotton fleet would. They were not all of the model of the *Saone*. A good many had straight sides, with only enough of a curve home to wear a graceful look and to suit the inclination of the shrouds, and often had a longer bow. These were large and fast carriers, and with a large freight on board they sailed well and attained an excellent rate of speed.

" Reference has been made to the evasion of tonnage duties. The success of a ship is necessarily and chiefly due first to a rigid keeping down of all her expenses and of strict economy both in and out of port, and next to her being placed in charge of a good captain and crew, the adoption of a model which would save taxation was a natural proceeding. It must be said, however, that the burdens of port charges and of taxation in its various forms never weigh hard on shipping unless trade is dull, freights are low, and competition is sharp. No matter how big and costly a ship, no matter what wages are paid or how expensively she is run (and a ship is an expensive investment, spending money right and left with a prodigality known in few forms of business), she can carry every burden if trade is good and freights are profitable, and spend from 20 to 45 per cent of her value, as she does every year without feeling it."[2]

No feature of American naval architecture is more noteworthy or more historically interesting than the development of clipper sailing ships. The clipper merchant vessel owes its origin to a variety of causes, while its higher specialization was due to influences to be referred to further on.

Prior to the Revolution, one of the most important industries of the American Colonies was shipbuilding, and the skill of the American naval architects and constructors had more than a local fame. At that early date and in the years immediately following the independence of the United States, vessels trading in the Mediterranean, in the West Indies, and in some other regions, were in danger of being attacked by pirates, and it became necessary to combine a considerable degree of speed with reasonable carrying capacity. The War of the Revolution, the restrictions put upon American commerce by England in the years that followed the conclusion of peace, when an American vessel usually had to fight or run, and the building of privateers to engage in the War of 1812–1815, taught American designers and builders many useful lessons in the construction of ships in which speed was necessary.

---

[2] Report on the Shipbuilding Industry of the United States, by Henry Hall, pp. 65–66.

"A permanent impression had been made upon the form and rig of American vessels by forty years of war and interference," writes Hall. "It was during that period that the shapes and fashions which prevail to-day were substantially attained. The old high poop decks and quarter galleries disappeared with the lateen and the lug sail on brigs, barks, and ships; the sharp stern was permanently abandoned; the curving home of the stem above the hawse holes went out of vogue, and vessels became longer in proportion to beam. The round bottoms were much in use, but the tendency toward a straight rise of the floor from the keel to a point half way to the outer width of the ship became marked and popular. Hollow water lines fore and aft were introduced; the forefoot of the hull ceased to be cut away so much and the swell of the sides became less marked; the bows became somewhat sharper and were often made flaring above the water, and the square sprit sail below the bowsprit was given up. American shipbuilders had not yet learned to give the vessels much sheer, however, and in the majority of them the sheer-line was almost straight from stem to stern. Nor had they learned to divide the topsail into an upper and a lower sail, and American vessels were distinguished by their short lower masts and the immense hoist of the topsail. The broadest beam was still at two-fifths the length from the bow. Hemp rigging, with broad channels and immense tops to the masts, was still retained; but the general arrangement and cut of the head, stay, square, and spanker sails at present in fashion were reached. The schooner rig had also become thoroughly popularized, especially for small vessels requiring speed, and the fast vessels of the day were the brigs and schooners, which were made long, sharp on the floor, and low in the water, with considerable rake to masts. The changes made in those forty years of perilous enterprise were chiefly introduced for the sake of speed and ease in handling the sails and the vessel. A merchantman was always liable to be called on to fight or to run away, and quickness in maneuvering and ability to slip away from an armed cruiser were qualities of the first importance. Builders were called on to study models and rig with reference to the needs of the times, and the result was that after the War of 1812, Americans had the ablest and smartest vessels in the world. Many ideas adopted by our builders were borrowed from the French, among whom naval architecture had been most critically and scientifically studied. The French frigates sent to assist us in the Revolution were closely studied, and when taken out of the water at Salem and elsewhere for repair, their lines were sometimes copied and frequently imitated in American-built ships. Many men-of-war and merchantmen were built on the models of these frigates, and it is possible that a part of the admiration expressed by the French for American frigates built during the Revolution, especially for the *Alliance*, which was the pride and favorite of our Navy, was due to that fact. Our vessels got rid of much of their old clumsy shape and look and improved materially in speed and beauty and in all other desirable qualities."[3]

At an early date Baltimore became noted for its clipper vessels, the fame of which extended to nearly all quarters of the globe. But. while the Baltimore clipper had attained world-wide celebrity, and its rakish lofty rig was easily recognized wherever seen, even early in the nineteenth century, it required the impetus found in the emigrant travel from Europe to America to bring the American clipper ship to that degree of perfection which it finally attained when it was without a rival on the ocean and was only equalled by the magnificent seamanship of those to whom its destinies were entrusted.

"The era of packet-ships was brought into existence by the demands of the increasing trade between the United States and Europe," says a writer in Harpers Magazine for January, 1884. "and the pioneer line, whose vessels, *Amity*, *Courier*, *Pacific*, *James Munroe*. *William Thompson*, *James Cropper*, *New York*. *Orbit*, *Nestor*, *Albion*, *Canada*, and *Columbia*. were unrivalled for strength, beauty and speed, and for the regularity of their departure and the proximately uniform time of their passages. was the famous Black Ball Line. founded in 1816, after the War of 1812 had secured the rights of American commerce * * *. During the first nine years the average time for sailing to Liverpool was 23 days and for returning home 40 days. but the *Canada* once made the outward trip in 15 days and 18 hours. The first four vessels of the list—the original Black Ballers—though of only 400 or 500 tons burden, were considered very large, and by the superiority of their cabins and general equipment caused the old merchantmen to seem shabby and uninhabitable."

Later several other lines were established from New York, among which the Red Star Line, founded in 1821, the Swallow-tail Line.

---

[3] Report on the Shipbuilding Industry of the United States, by Henry Hall, pp. 63–64.

and the Dramatic Line were prominent. The first line of packets to Havre was founded about 1822, and this was shortly succeeded by a second line.

The rivalry of these lines led to an increase in the size of ships and much improvement in speed. Quick voyages paid large dividends, and there was the keenest competition between rival captains. Passages were forced across the Atlantic, and ships staggered under a press of sail in the heaviest weather. But they were built for the work, and, under the splendid management of their officers, they seldom met with serious mishaps. As an example of the power of sailing clipper ships, as well as of the courage and hardihood of the American sailor of that date, it is related of Capt. John Johnston, who commanded the packet service between New York and Havre, that on one occasion he said, " In all my career I never knew the wind to blow but twice." One of the incidents referred to was when he was in command of the *Rhone*, August 16, 1839, at which time every stitch of canvas was blown away by a hurricane, which did not leave a piece of cloth so large as a man's head.

The *Ashburton*, 1,015 tons, built in 1843, was one of the largest packet ships of that date. She was constructed to rival the *Patrick Henry* of about 1,000 tons and the *Roscius* of approximately the same capacity. " The *Henry Clay*, 1,250 tons, came next, large and with three decks, and all New York rushed to see her as she lay at her pier, No. 18 East River, just opposite the Grinnell office. * * * The *New World*, 1,400 tons, was another wonder, the largest vessel afloat in 1846."[4]

" The American packets," writes Hall, " carried the best officers and the largest crews of any ships afloat. They were fast, dry, handsome, and sumptously fitted up, and were managed with so much energy, care, and ability that they gained a virtual monopoly of the passenger, mail, and express traffic to Europe. They made the best time of any ships afloat, were insured at the lowest rates, and earned the highest freights, and superseded nearly all English, French, and German ships in that business, and their success and fame were the subject of intense envy abroad.

" The qualities desired in a packet ship were strength, speed, stability at sea, ease of handling, easy rolling, beauty of model, and comfort in the passenger accommodations. It must not be supposed that these were all attained at one bound; on the contrary, the best good general model for a packet ship and the best sizes and dimensions of timbers were reached only by patient study and slow degrees. A great many bad ships were built before all the questions that interested the building world were decided, but it was the final result of 40 years of study and investigation following the War of 1812 that the sailing ship reached substantial perfection as an ocean carrier, and scarce any advance has been made from that day to this."

---

[4] Harper's Weekly.

Previous to 1850 the packet ship began to be superseded by the trans-Atlantic steamship, and though she held on for some years thereafter, carrying freight and the cheaper class of emigrant travel, her occupation was doomed, so far as trans-Atlantic travel was concerned. However, her glorious career gave birth to the extreme clipper ship, which was the legitimate successor of the earlier trans-Atlantic packet, and was called into existence chiefly to meet the requirements of the California trade "around the Horn," and was also in demand for the Australian service and the China tea trade. Many of the American clippers, after discharging their cargoes at San Francisco, went to China, and, owing to their great speed, soon obtained a monopoly of the China trade with Great Britain.

The clipper ship was designed primarily for carrying freight, and the chief object in her construction was to obtain the maximum of speed when laden with a cargo. From 1815 to 1845 the packets were the swiftest vessels on the sea, but after 1845 several branches of trade developed in which speed was as important for the purposes of commerce as it had been for passenger travel. "For instance," writes Hall, "there was the tea trade from China to the United States, in which speed had always been thought essential. The cargoes consisted of teas, spices, coffee, dried fruits, etc., which were liable to deteriorate in a long voyage of four months to the home port, and to shorten the voyage as much as possible was desirable for obvious reasons. Furthermore, there were no telegraph lines and ocean cables in those days, and the uncertainty of the markets made fast trips home from the East Indies very important. Merchants had repeatedly suffered heavy loss, sometimes ruin, by the decline in cotton and other eastern goods brought home by ships during their absence in the voyage out and back, and good ships were therefore required in that trade. Both in America and in Europe up to 1845 the East Indiamen were, as a rule, the large and fast freighting ships of their day. After 1815 a friendly rivalry broke out among owners of ships sailing to China, and every year races took place homeward with the first offerings of the new crop of tea which had come down to Chinese ports. The shipping houses gave their captains good vessels, and the captains did their part by driving the ships homeward through all sorts of weather, with all the canvass spread that they could carry. Americans earned a world-wide reputation for speed soon after 1814, and finally put the English so much on their mettle that the latter sent out a new and finer class of merchantmen than they had ever before owned to contest for the palm of superiority. The *Alexander Baring*, *John O'Gaunt*, *Euphrates*, *Monarch*, *Foam*, and other ships of that class were equal to any under the flag of the United States in capacity, spread of canvass, and speed. This, in turn, stimulated the pride of the American houses, who responded between 1840 and 1850 with vessels of good and carefully studied form. The vessels sat low in the water, in strong distinction from the fashion of earlier times. The beam was broad, the bow sharp, and the water lines fine. The masts were tall and raking and the yards were so long that the ships spread an enormous cloud of canvas in a favoring wind. With these vessels the Americans kept their position ahead of all competitors."

The experience gained by American builders in constructing packet ships prepared them for the highest achievements in producing great white-winged clippers, such as had never previously sailed the seas, and which for years were the wonder of the world, carrying the name and fame of American naval architects to the remotest corners of the globe. The size, as well as the performances, of these vessels may well be considered phenomenal and mark a proud era in the history of American sea commerce. It is a remarkable fact that as late as 1880 an American clipper ship held the world's record for a 24-hours run, which at that time had never been exceeded by an ocean steamer.

The early clippers were of modest proportions, but they rapidly increased in size. Clipper ships were first built at New York. The ship, *Helena*, of 650 tons was the pioneer. She was built for the China trade by William H. Webb in 1841. She was followed by the *Rainbow* of 750 tons, built by Smith & Dimon. The *Houqua*, of 706 tons, built in 1844, the *Sea Witch* of 907 tons, and the *Samuel Russell*, of 940 tons, were others of the early clippers that attained celebrity in their day. The carrying capacity of these vessels was, however, limited, and their construction was so light that, when driven hard in heavy weather, they became strained so much that "the cost of repairs was discouraging."

William H. Webb, a shipbuilder of New York, with marked boldness of conception and unfaltering energy, determined to "solve the problem of combined speed, capacity, and strength." In 1851 he put upon the stocks four clipper ships designed for this purpose. These were the *Sword Fish*, of 1,150 tons, which established the record between Shanghai and San Francisco, by sailing the distance between those ports in 31 days, making an average of 240 miles a day; the *Comet*,[5] 1,209 tons, "remarkable for speed, seaworthiness, strength, productiveness, and good luck" (the round trip to San Francisco was made by her in seven months and nine days; the run home was made in 76 days, the shortest time on record); the *Challenge*, of 2,000 tons, and the *Invincible*, of 2,150 tons. It is said of the *Challenge*, that "when lying at the foot of Pine Street (New York), her bowsprit at high tide reached over the roofs of the stores; crowds went down to see her."

---

[5] The model of this famous vessel is in the Museum collections.

As has been indicated, the speed of the great clippers was phenomenal. When they were favored with strong trade winds they often "ran for days or weeks in succession at an average speed of from 12 to 15 miles an hour." It was not exceptional for them to make 300 miles in 24 hours. The *Red Jacket* averaged 325 miles a day for a week; the *Flying Cloud* is credited with sailing 427½ miles in 24 hours; the Australian packet ship, *James Bains*, built in Boston by Donald McKay, on one occasion sailed 420 miles in 24 hours; while it is said that the *Sovereign of the Seas* attained the remarkable record of 437 miles in 24 hours, when on a passage from the Hawaiian Islands to New York, which she made in 82 days. This day's run was, up to 1880, according to Hall, "the fastest time ever made by any vessel, sailer or steamer, on the deep sea. The average time of the fast Atlantic steamers does not exceed 400 miles a day, and there is no record better than that made recently by the *Alaska*, which on one occasion made 419 miles a day."

So far as regards size, the *Great Republic*, of 5,923 gross tons, was the culmination of clipper ships. She was built by Donald McKay at East Boston in 1853 and rigged with four masts, but, having been partially burned while loading at New York for her first voyage, she was cut down one deck and rigged like an ordinary ship with three masts. With this rig she did not develop high speed.

The sailing ship of the present day is strictly a freight-carrying vessel, and cargo capacity is a primary qualification. Still the lessons learned by American builders in the construction of clippers has enabled them to turn out ships which, while having large capacity, are so symmetrically formed and so well rigged that their speed is only second to the ocean racers that preceded them. They are not excelled by any wooden vessels afloat, but modern commerce demands ships of iron and steel. These demands must be met, and the constructive material of our foreign-going sailing ships must come from our rich mines rather than from the magnificent forests that formerly supplied it. With this exception, the sailing ship must necessarily remain substantially what she is to-day, for the field of experimentation in design and rig has been pretty thoroughly exhausted.

The settlement and development of the interior of the United States gave birth to a peculiar style of naval architecture which the environment of the colonists called into existence. The most feasible method of reaching a market for the products of the fertile fields and forests of the West was by the great rivers that wound their way to the sea. The current of the streams furnished the motive power before the advent of steam, and a raft or boat once afloat, if properly guided, would in time reach its destination, which might be New Orleans or one of the "up-river" towns on the banks of the Mississippi or its tributaries.

It was impracticable to return with the flat boats, keel boats, and other similar craft, for they could not be propelled against the stream. The chief object sought in their construction was, therefore, to provide flotation for various products, like flour, corn, cotton, etc., whereby they could be transported to market or a shipping point. This being the case, the ship of the river was constructed in the cheapest and crudest manner possibly consistent with the obtainment of requisite strength, and the ultimate object of the builder was the disposal of his boat or boats for lumber. Being built of roughly hewn logs, fastened together with wooden treenails, the hull could be wedged apart, while the boarding or planking of the superstructure was purposely put on so that it could be removed without much trouble or damage. The scow-shaped boat was the form naturally adopted by river builders, since its flat bottom, straight sides, and square ends not only were most favorable for its future disposal but gave the maximum of capacity on a light draft. In some cases, however, there was an attempt to improve the river boats by making them comparatively narrow and building them with round bows. One type was called "keel boat," and was much in favor on the Ohio River for carrying flour or other products.

While these rude fabrics may seem scarcely deserving of notice when considered in conjunction with the lofty and symmetrical clipper ship, their importance becomes more apparent when it is understood that they were among the chief factors in developing the vast interior of this country prior to the advent of the steamboat and the railroad.

In no other direction has naval architecture in this country been more distinctively American than in the building of pilot boats, which, practically without exception, were schooner rigged.

At an early date the pilot schooner of New York was noted for its speed and seagoing qualities. Prior to 1850 it had been brought to a high state of perfection by Steers, and it is a noteworthy fact that the yacht *America*, which won the Queen's cup (now called America's cup) in 1851 was a highly specialized pilot boat and was rigged exactly like one. Undoubtedly the experience gained by Steers in building pilot boats enabled him to produce the *America*.

From 1830 to 1855, or later, the distinguishing features of the American pilot boat were considerable depth and beam, sharp floor, heavy drag, and strongly raking masts. For a number of years they were built on the "cod's head and mackerel's tail" principle, having a long fine run but comparatively fuller lines forward. About 1850 a marked change was made in this particular, and some of the pilot boats built about that time had much finer entrances than had been given such vessels before, and their speed was much improved—always an important factor in a pilot vessel, the success of which often depends on her ability to overhaul inward bound ships.

The success attained later with wide, shallow yachts naturally had its influence on designers of pilot boats, with the result that a few vessels of this class were made with less depth and more beam than formerly, though the cutter bow with straight, nearly vertical stem above water and the V-shaped stern introduced about 1850 still remained distinguishing characteristics.

It was soon found, however, that shallow vessels were unfitted for the pilot service, for which the stanchest and most seaworthy schooners are required, and in time they were discarded, while deeper and somewhat narrower schooners with lead and iron ballast placed low inside were substituted. The latter proved superior for the work they had to do both in speed and seagoing qualities, and when exposed to heavy gales weathered the storms in safety. Perhaps in all the world no vessel of its size could be found in which the requisite qualities of speed and safety were more completely combined than in the American pilot schooner.

Few things in America have been more noticeable than the remarkable development in recent years of a love for yachting, and the use of boats purely for the purposes of pleasure. While this evidences the accumulation of wealth and an industrial condition which gives to many the requisite means and leisure to enjoy the noblest sport at the command of man, or recreation in a more modest and inexpensive manner—perhaps in a rowboat only—it is of special interest to the student of naval architecture, since the building of yachts and pleasure boats has led to the highest possible attainment in certain directions, and doubtless has materially influenced the development of vessels used in commerce or war. Necessarily, speed is a prime factor in a yacht, for the friendly rivalry of owners, natural enough under any circumstances, is intensified by frequent competitive races, with the result that both time and money are expended without stint to secure the swiftest vessel and the greatest skill in seamanship.

All this has a most decided influence on naval architecture, for the rivalry which exists between renowned architects or builders is not second to that of those who own the products of their skill. Thus, with their wits sharpened by ambition, they are prompted to exert themselves to the utmost to discover new ideas, both in form and materials of construction, the consequence of which is a frequently marked advance of much importance, perhaps, to maritime countries. Inasmuch as this applies to steam vessels (though perhaps in a less degree), as well as to those propelled by sail alone, the researches made cover all fields of naval architecture, and, to that extent, are correspondingly important.

Yachting in the United States is a sport of comparatively recent date, but its popularity is emphasized by the large aggregation of various types of craft devoted to it—from a small catboat, tiny canoe, or diminutive "single-hander" to the stately steamship, built regardless of expense, which looks imposing enough to be a war vessel. It is true that vessels were built in the United States for purposes of pleasure at the very beginning of the nineteenth century. For instance, the *Jefferson* of 22 tons was launched at Salem, Mass., in 1801. She was a privateer in 1812 and in 1815 was sold to Gloucester for a fishing vessel. The *Diver* was built in 1802 by John C. Stevens, who later produced the *Trouble*, *Wave*, and *Onkahie*, the latter being "his first attempt at a sharp bow and clean run."

One of the most noted pleasure vessels of early days was a topsail schooner built at Salem in 1816. She was first named *Car of Concordia*, but this was not painted on her stern, the name being changed to *Cleopatra's Barge* before she was ready for service. "She was 83 feet long on the water line, 22 feet 11½ inches wide, and 11 feet 5½ inches in depth * * * She tonned 191$\frac{41}{95}$."

Cleopatra's Barge was painted in different patterns on her two sides, one side being in horizontal stripes of many colors and the other side with a herringbone pattern.[6]

But while vessels had been built in the United States for pleasure at an earlier date, yachting in this country really had its birth with the organization of the New York Yacht Club on July 30, 1844. This was the only yacht club in the United States for five years, but, according to a well-known authority, "it was not until the Brooklyn Yacht Club was organized in 1857 that there was anything like a yacht club, in the present significance of the term, in all the United States."[7] There has been a constantly accelerating development, as already indicated, and the fleet of pleasure vessels has grown from a few small schooners of the pilot-boat type in the forties until its white sails are seen along both coasts and in the lake region, while the sharp bows of its steamers cleave the waters that wash the shores of both Europe and America.

The increase in the number of steam yachts in recent years has been phenomenal in the United States. While the majority of these are of comparatively limited dimensions, and many of them are only steam launches, used for harbor service or for cruising on bays, sounds, and rivers, some of them are of large size and fitted in every way to make distant voyages, as, indeed, many of them have done.

---

[6] The Yachts and Yachtsmen of America, edited by Henry A. Mott, jr., pp. 47–48.

[7] The History of American Yachting, by Capt. R. F. Coffin.

Aside from the ordinary purposes of pleasure, many men doing business in the large seacoast cities, and having residences accessible by water at a considerable distance, find it more conducive to their comfort and success to own a small yacht on which they can make their daily trips to and from the city. Many prefer steam yachts to sailing vessels, because of the certainty of arriving at any particular destination at a given time, and possibly also in some instances because of certain other advantages to be found on a large cruising yacht sumptuously fitted up for the accommodation of its owner and his guests on long or short voyages.

The collections in the National Museum representing this class of vessels is only a limited one, a small nucleus around which it is hoped may in time be gathered much material that will serve to preserve a tangible historical record of this branch of American naval architecture.

The competitive races which have taken place in the United States between the yachts of different clubs and of the same club, as well as between American and foreign yachts, have not only proved interesting but instructive in the highest degree. The knowledge gained by experts in observing these friendly contests has led to a development of speed in sailing vessels far beyond what might reasonably have been expected a few decades ago.

Among the incentives which have prompted the highest effort on the part of yacht designers, sail makers, and yachtsmen, none rank higher than the international races which have taken place between British and American yachts since the *America* won the "Queen's cup" in 1851. British yachts have repeatedly challenged for this cup, which has now become the emblem of the yachting supremacy of the world, and the fact that it has been successfully defended for so many years evidences the skill and high attainments of those who have had to do with designing, building, and sailing the defenders of the cup.

In the meantime there have been many changes in American sailing yachts. The schooner has been a favorite with American yachtsmen from the start, and notwithstanding the sloop *Maria* early demonstrated the advantages which a "single sticker" may possess in the matter of speed, even our cup defenders for many years were schooners.

The early yachts, and particularly the *America*, were deep keel vessels. As has been mentioned, they were of the pilot-boat type, and were as good seagoing boats of their size as could be found. The success of the *Maria*, however, which was wide and shallow, resembling in many particulars the sloops employed on the Hudson River, doubtless had a marked influence on designers and led to the building of wide, shallow, centerboard vessels for yachting purposes, most of which were schooner rigged, though the sloop rig gradually came into favor for small and medium sized yachts. The measurement rules also had much to do with this development, since beam and sail area were not taxed, and with these advantages in its favor the "skimming dish" was believed by many to be superior to any other type in the matter of speed.

About 1880 many Americans interested in yachting advocated a change in the style of our sailing vessels. Some extremists urged the adoption of the deep, narrow, lead-keeled cutter of the British type, and several vessels of this kind were purchased by Americans in England or were built in the United States. In 1885, however, Edward Burgess, in designing the *Puritan* to defend the America's cup against the British cutter yacht, *Genesta*, produced a compromise type which was so successful that its advent ultimately led to a material modification of American racing yachts. In designing the *Volunteer*, to defend the America's cup two years after the *Puritan* was built, Mr. Burgess departed considerably from his design of 1885 by making a deeper vessel with less beam, lower outside ballast, and a moderately overhanging bow. The *Volunteer* was phenomenally fast, and for some years remained the queen of racers.

In 1890, however, Nathanael G. Herreshoff built the *Gloriana* from his own designs. She was a marked innovation on anything previously produced in this country. This yacht quickly demonstrated her superiority over any vessels in her class. She was followed the next year by the *Wasp*, built by Herreshoff, which proved faster than the *Gloriana*.

In 1892 another challenge for the America's cup was given by British yachtsmen and Mr. Herrshoff designed and built the *Vigilant* to defend it. This vessel was in most particulars an enlarged *Wasp*, and in the autumn of 1893 she won in each of the three races sailed. The *Vigilant* was a beamy vessel with long overhangs fore and aft, deep lead keel and centerboard.

In 1894 she crossed the Atlantic and in a number of races sailed in British waters she was defeated oftener than she won by the Prince of Wales's cutter, *Britannia*.

In the meanwhile Herreshoff and others had been experimenting extensively in building small fin-keeled racing yachts—these little vessels having for ballast a fish-shaped bulb of lead secured to the lower edge of a deep plate, the upper part of which was fastened to the hull. The experience gained in the building of these diminutive racers, which proved phenomenally fast, doubtless had a marked influence on designer Herreshoff, for, when called upon to produce a vessel to defend the America's cup in 1895, he turned out a sloop embodying the main features on a larger scale of the smaller fin-keeled boats. This vessel was named the *Defender.* She was a modification of the *Vigilant*, with a deep fixed keel (without centerboard), having a lead bulb at its lower edge. Her successful defense of the cup is a matter of recent history and need not be dwelt on here.

It is pertinent, however, to mention that, whereas the early yachts were built of wood and comparatively little attention was given to details in the matter of weight, etc., these modern "racing machines," particularly the cup defenders, have been constructed of metal, and science has been taxed to the utmost to determine with exactness the strength of materials, and to reduce the weight of hull, spars, and rigging as much as possible consistent with requisite strength, in order that the weight thus saved may be included in the lead keel, thereby increasing the sail-carrying power of the yacht to that extent. To such an extreme has this been carried that, while the hull of the *Defender* below the water line was built of manganese bronze, a comparatively heavy metal, the upper part of the hull was constructed of a combination of aluminum and other metals whereby the weight was materially reduced. Hollow steel spars were also, in part, used by both the challenger, the *Valkyrie III*, and the *Defender.*

Thus it will be seen that, whereas the vessels used for racing 40 or 50 years ago were to a greater or less extent the result of a sort of "rule or thumb" design, the demands of a later day call for the highest skill in this branch of naval architecture—a skill which has been so highly specialized under the impulse which has prompted its development that it can not but prove of material benefit to all industries dependent directly or indirectly for success upon maritime transportation.

While every man can not own a steam yacht or, perhaps, even a sailing yacht, he can obtain much pleasure and recreation in a simpler and less expensive way. Consequently, large numbers of men find much gratification in owning a rowboat; a folding boat which may be taken into the wilds and there used on lake or stream for angling or hunting; or a racing or cruising canoe, in which diminutive craft may be found all the excitement that attends races in more pretentious craft. Aside from the pleasure derived from owning and sailing boats such as have been alluded to, the fact should not be lost sight of that the experience in water craft gained in the management of these boats often trains men and fits them for higher achievements in broader fields of naval adventure. At the same time it makes them experienced critics of boat architecture, and their requirements have led to a development in the construction of the craft they use which is scarcely second to that attained by the builders of large racing yachts.

The fishing fleet of a nation is an important factor in the development of its commerce as well as in its naval success. The building of fishing boats and vessels develops a taste for naval architecture which often may result in decided benefit to the country, as well as advantage to the individual. The boy or man who obtains the rudiments of naval construction while building a boat or larger craft for himself, in which he is to prosecute his calling, may thus develop latent mechanical powers with which nature has endowed him, with the result that his early training in boat construction may lead him to higher effort until he becomes a skilled builder of ships. And these boats and vessels, besides accomplishing the more special objects for which they were constructed, become training ships upon which large numbers of seamen receive their technical education which fits them not only for fishermen but also to fill positions of responsibility in other naval pursuits. It is a well-established historical fact that those nations which have enjoyed remarkable commercial prosperity and naval supremacy can trace their success in these particulars directly to their fishing industries, the pursuit of which has developed an adventurous and enterprising naval spirit in the people.

The colonization of North America was due almost wholly to the interest felt in the fisheries of the western Atlantic, and to this cause alone may we look for the motive that induced people to settle in localities which afforded small attractions of any other kind. As a result of the tendencies of the early settlers to engage in the fisheries, a fleet of fishing vessels was employed as soon as the country was occupied. The history of the development of naval architecture, as applied to the fisheries of the United States, would constitute a most interesting chapter if space permitted its inclusion. But nothing beyond a brief summary or limited reference to the more notable types is possible here.

A most remarkable event in the history of the American fishing fleet was the employment of steamers, though steam has not taken so prominent a position in our ocean fisheries as one might naturally expect in an age when it has become nearly universal. The extreme swiftness of our sailing vessels, the fact that a large percentage of our ocean-food fishes are cured at sea and marketed in a salted condition, the comparative cheapness of sailing craft, and also because they can be kept at sea at far less expense, are causes which, so far, have operated to prevent the employment of steamers in any of the sea fisheries which are carried on at long distances from the land. Attempts have been made to introduce steamers into the winter haddock and the summer mackerel fisheries, but the results obtained were not satisfactory, and the regular employment of such vessels in those or kindred branches of the fisheries has apparently been indefinitely postponed.

Screw steamers were introduced for the capture of menhaden about 1871. In a description by Boardman and Atkins of the methods employed in the menhaden fishery about Boothbay, Me., in 1874, it is said that "they [steamers] were introduced on the coast of Maine three years ago." Steamers were found remarkably well adapted for this fishery, where quick dispatch is a necessity, and the fish are taken from the great purse seines and thrown in bulk in the vessel's hold, where they lie until they are transferred to the factory—on the arrival of the steamer in port—to be converted into fertilizers and oil. In the year of 1888 there were 55 steamers employed in the menhaden fisheries, their aggregate tonnage amounting to 3,681.61 tons. The smallest of the fleet, and the first built for this fishery, the *Seven Brothers*, is 27.32 tons, while the largest, the *George W. Humphries* a "double-gang steamer," is 214.55 tons, with 250 horsepower.

Screw steamers are used to some extent in the fisheries of the Great Lakes. Some of these are employed chiefly in carrying to market the product of the traps and pounds, and are generally called "pound steamers." The most of them, however, fish with long strings of gill nets and are called "gill-net steamers." There are certain local differences in these vessels, but generally speaking they resemble an ordinary steam tug, being, however, somewhat wider and rather flatter on the floor. They range in size from 10 to about 45 tons.

The first attempt to use steam power for oyster dredging of which we have any knowledge was made at Norwalk, Conn., when a boiler and engine were put on board the sloop, *Early Bird*, in 1874 for the purpose only of turning the drums with which the dredge lines were hauled. Later this vessel was further improved by the addition of a propeller, and this was found to add so materially to her effectiveness that since that time screw steamers have been built expressly for this work. They are generally of small size, ranging from 20 to 63 tons, from 50 to 83 feet in length, with a beam of 12 to 20 feet.

In 1880 there were two small screw steamers of the tug pattern employed in the clam fisheries of the United States, one of these, however, spending a portion of her time in the "sardine" fisheries, in which also, another small tug found employment. In the latter industry the work of the steamers consisted chiefly in towing fishing boats to and from the factories or packing establishments.

In recent years small steamers have been employed exclusively in the lobster fishery from New England. The first of these was the

Eva of Noank, Conn., a small screw steamer built for the lobster fishery in 1883; she was 14.10 tons gross, and 7.05 tons net register. Her success led to the building of other steamers, though the number is very limited.

Small, light-draught, side-wheel steamers are used to some extent for "laying out" seines in the broad shallow waters of the South, especially about Albemarle Sound.

Steamers have been employed in the market fishery at Tampa, chiefly for transporting the catch of the fishing gangs from the "beaches" or "ranches" to Tampa.

Steam schooners are much in favor with those engaged in the salmon fisheries of Alaska, and quite a fleet of those vessels has been built for this purpose.

Steam tugs and launches are used to some extent by salmon packers on the Columbia River and Puget Sound.

Several steamers were built for prosecuting the market fishery from San Francisco. One of the first was the *Golden Gate*, of which there is a rigged model in the collections.

Steam was first utilized for the whale fishery of the United States in 1865. In that year the steamer *Pioneer*, formerly a Government transport, was rebuilt for and sent on a whaling voyage. It was four years later, however, before a steam whaler specially designed and built for that purpose was put afloat. This was the auxiliary steam bark, *Mary and Helen*, launched at Bath, Me., on July 17, 1879. Her marked success led to the building of other vessels of her class—one to take her place—for she was sold to the United States Government after her first cruise and under the name of *Rogers* went in search of the missing Arctic exploring steamer *Jeannette*. She was burned at St. Lawrence Bay, Siberia, on November 30, 1881.

The employment of steam vessels in the Arctic whale fishery has led to important results, for, while sailing vessels have often met with poor success, the steamers, being able to penetrate the ice fields of the North, have made wonderful catches. In late years it has been common for them to winter in the vicinity of the mouth of the Mackenzie River, far east of Point Barrow, and often they had a big season's catch before other vessels could force their way through the ice packs to the whaling grounds.

The *Orca*, of which an excellent rigged model is included in the collections, is the largest vessel of this class and is certainly one of the best.

According to the old records, snows and ketches were employed in the bank cod fisheries when the business was first established, and at an early date sloops were also engaged in fishing. In the records of Massachusetts Colony, 1680, the statement is made that "there are about one hundred or one hundred and twenty ships, sloops, and other vessels that trade to and from hence, yearly of our own or English build, most of them belonging to this colony. We have eight or ten ships (probably more) of one hundred tons or more, and about forty or fifty fishing "ketches" of between twenty and forty tons. Six or eight English ships do usually come hither yearly belonging to the Kingdom of England, bringing commodities of all sorts from thence."

The so-called ketches were probably employed to a greater extent than any others. These vessels were full and heavy built, with a peculiar rig that was at first invented for a bomb vessel (the mainmast standing about amidship to give room for ordnance forward), but afterwards came into great favor for yachts and fishing crafts. The "snows" were generally larger than the ketches, square-rigged on two masts and having a small jiggermast at the stern.

Smaller vessels with one or perhaps two masts, carrying a square sail on the mainmast, were doubtless employed to a considerable extent in the fisheries in early colonial times. The *Sparrow Hawk*, which was lost on Cape Cod a few years after the settlement of Massachusetts, can be accepted as the type of this class.

A distinguishing feature of the sloops of the early colonial times was that many if not most of them carried square topsails. These were, of course, better adapted for fishing near the land than for making extended cruises to the banks.

The first marked improvement in the American fishing vessels was the invention of the schooner rig early in the eighteenth century. The difficulties attending the adoption of a new rig in former times is evidenced by illustrations of warships of the eighteenth century and previously, on which lateen sails were carried on the mizzen. Illustrations of French men-of-war in 1764, however, show that the portion of the sail forward of the mast was no longer carried, probably owing to the difficulty of lowering and shifting the yard whenever the ship changed her tack. The yard was, nevertheless, kept its full length, simply, it would appear, because no one could invent a gaff or similar device to take its place. We may, therefore, look upon the invention of the schooner rig, which has now become so popular in America, as a matter of special importance in the history of our fishing fleet. The particular incident which gave to this rig the name of schooner is thus described:

"Captain Robinson built and rigged a 'ketch,' as they were then called. masted and rigged it in a new and peculiar manner; when launched, the peculiar motion she made as she glided into the water from the stocks caused one of the bystanders to exclaim, 'Oh, how she scoons.' Robinson instantly dashed a bottle of rum against her bow and exclaimed, 'A scooner let her be!' And thus the schooner originated." This event happened in Gloucester in 1713, according

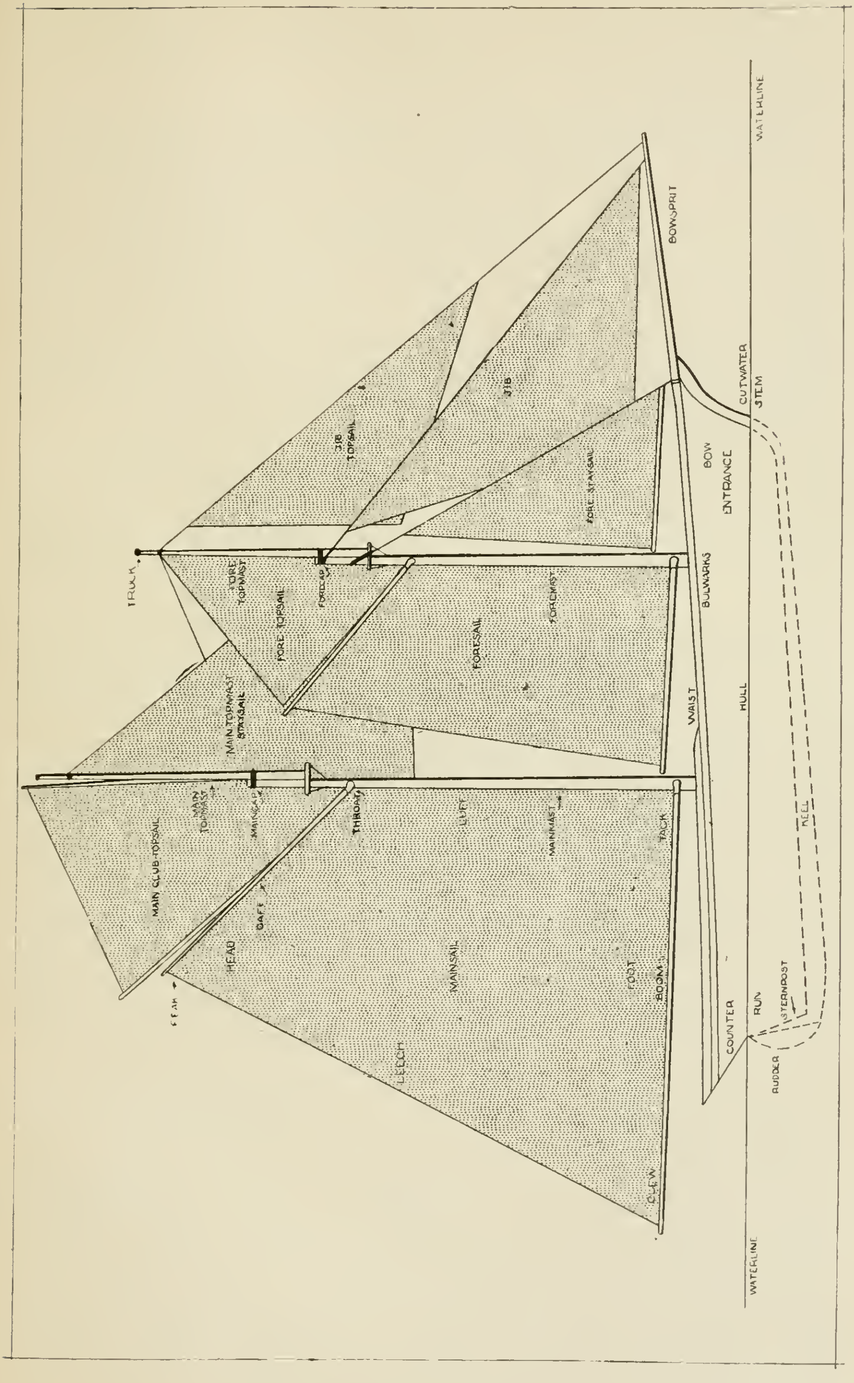

WATERLINE
BOWSPRIT
CUTWATER
STEM
BOW
ENTRANCE
JIB
JIB TOPSAIL
FORE STAYSAIL
TRUCK
FORE TOPMAST
FORE TOPSAIL
FORECAP
FORESAIL
FOREMAST
BULWARKS
WAIST
HULL
MAIN TOPMAST STAYSAIL
MAIN CLUB-TOPSAIL
MAIN TOPMAST
MAINCAP
THROAT
LUFF
MAINMAST
TACK
GAFF
HEAD
MAINSAIL
FOOT
BOOM
KEEL
PEAK
STERNPOST
RUN
COUNTER
RUDDER
LEECH
CLEW
WATERLINE

FIG. 1.—SAIL PLAN OF MODERN TWO-MASTED SCHOONER.

to the historical account, and as early as 1716 mention is made of the employment of a "scooner" in the fisheries off Cape Sable, Nova Scotia, and it is possible this may have been the original one built by Captain Robinson.

The schooners employed in the Grand Bank cod fisheries from New England, chiefly from the port of Marblehead, Mass., previous to the War of Independence were full built, round-bodied craft, specially noted for having short and high quarter-decks, from which peculiarity they derived the appellation of "heel-tappers" at a later date, when a different type of fishing vessel came into general use.

Previous to 1775 Marblehead had a fleet of more than 150 fishing schooners, while it is said that as early as 1701 Gloucester had a fleet of 70 vessels employed in the Grand Bank cod fisheries. Many of the largest of the New England fleet made winter voyages to Spain, chiefly to Bilboa, where they carried the products of their summer's fishing, and returned home laden with European goods. In this way the spirit of adventure was stimulated and increased, and many of the New England fishermen became very skillful seamen.

The period between 1775 and 1815, during which time occurred the War of the Revolution, the embargo act, and the War of 1812–1815, was a very unfavorable one for the American fisheries. The larger class of fishing vessels, those which had been employed on the Grand Bank and other distant fishing grounds, were compelled to lie idle, while in most cases the hardy men who had composed their crews were employed in the Army or Navy. The fishermen, impoverished by the long struggle for independence, were unable after the peace of 1783 to build and equip large vessels; therefore they provided themselves with smaller craft, in which they fished on the grounds in Massachusetts Bay and adjacent waters. This was the period when the "Chebacco boat" came into general use. These peculiar boats derive their specific name from Chebacco, now a part of the town of Essex, Mass., where they originated. At first they were generally sharp aft, with a "pink" stern, usually only partially decked—being what were called "standing-room boats"—with two masts and two sails. Later they were built larger, rarely, however, so large as 20 tons, and decked, while many were made with square stern and nicknamed "dogboddies." About 1820 the fisheries began to gain in prosperity, the size of the sharp-sterned craft increased, a bowsprit with a jib was added, and a new style of fishing vessel, the "pinkey," was the result. Though in the meantime some square-sterned vessels were employed, the pinkey remained in most general use until about 1840, when the low quarter-deck, but still full-bowed schooner, was extensively introduced.

The second great event in the history of the American fishing fleet was the change from blunt to clipper schooners. It is claimed by some authorities that the changes made in the models of our fishing vessels was the source from which sprang the famous American clipper ships which at one period made our merchant marine so justly celebrated, both for its vessels and the superior seamanship of their officers and crews.

The requirements of the mackerel fishery and of the oyster trade made swift sailing vessels a necessity, and about 1845 ambitious builders began to make some changes. It was not, however, until 1847 that the first really sharp vessel, the *Romp*, was built, and it is a matter of record that men were at first afraid to go on her, though when once tried she was found to be an excellent sea boat. Subsequently she made the passage around Cape Horn to California. About this time, too, clipper schooners built at Baltimore, of the type ordinarily called "Bay boats," were introduced in the New England mackerel fishery; but these, while generally swift in light winds and smooth water, were mostly too shallow for rough Atlantic weather, and were soon discarded in favor of home-built vessels that were more seaworthy.

Many experiments were tried in building clipper fishing schooners, and it may not be considered remarkable that some of them proved very unsafe and unsatisfactory. At first the vessels were generally very sharp on the floor, with a heavy drag; narrow, deep stern; more or less strongly flaring bow; the entrance convex and only moderately sharp, the bow being about two-fifths the vessel's length, while the after underwater lines were much easier. It was a sort of combination of the Baltimore type and the New York pilot boat.

After considerable experimentation a beamy, wide-sterned, sharp, and rather shallow type of schooner was generally adopted. Unfortunately, however, in the effort to attain a high rate of speed and large initial stability, so that much sail could be carried with a comparatively small amount of ballast, a vessel was produced which, though it seemed to have certain advantages, was, nevertheless, unsafe to a dangerous degree. Consequently, though fishing schooners increased in size and should have proved more seaworthy, the ratio of loss by foundering at sea was, notwithstanding, frightfully larger than ever before. A fearful source of disaster was the liability of schooners of that type to capsize or be tripped by a heavy sea and their inability to right again, owing to the lack of a low center of gravity and an unusual length and weight of spars.

The most remarkable and important change made in designing clipper schooners for the deep-sea fisheries occurred between 1880 and 1890. In 1884 D. J. Lawlor, well known as a prominent designer of fishing schooners, pilot boats, and yachts, built the schooner *Roulette*, which was made about 2 feet deeper than the ordinary fishing vessel of her length. Her advent in the fishing fleet had a marked influence, for it was soon seen that she was not only vastly superior in heavy weather, but much swifter than other clipper schooners under ordinary conditions.

In 1885 Capt. J. W. Collins designed the schooner *Grampus* for the United States Fish Commission and subsequently superintended her construction. She was a radical departure from the ordinary schooner in use at that time, having somewhat less beam and fully 2 feet more depth than the average fishing schooner of her length. While her increased depth added to her safety, she proved so much swifter than contemporaneous fishing vessels that enterprising builders soon began to copy her. At the same time the skill of Edward Burgess and of others second only to him in ability was called into requisition, with the result that a complete revolution was made in the form and rig of the New England fishing schooner. Suffice it to say that, after passing through many changes, the clipper fishing schooner of New England is to-day second to none in beauty, speed, equipment, safety, and ability to make passages in all weathers. A study of the collections of builders' models, rigged models, lines, and sail plans, showing the evolution of the American fishing schooner, will enable one to gain a better idea of this subject than can be conveyed in the limited space available for its discussion.

The schooners and sloops employed in the oyster fishery, the sponge fishery, etc., deserve more than a passing mention, though it is impossible to allude to them at length. The oyster "pungy" of the Chesapeake was one of the first, if not the earliest, clipper schooners employed in the fisheries of the United States, and it is a remarkable fact that it has practically undergone no change in form or rig for the past half century. While it varies in depth, a variation often due to the locality in which it operates, it is always wide, with a sharp floor, moderately easy lines fore and aft, strongly raking stem and sternpost, and long, tapering, raking masts. It turns quickly and is a good sailer, even in these days of swift vessels. While it is susceptible to improvement, it is unquestionably well adapted to its work and no doubt will remain substantially what it is for many years to come.

The "bugeye" is a noteworthy, distinctive type of vessel employed in the oyster fishery of the Chesapeake, and at the present time there is nothing like it in the fishing fleets of the United States. It is simply a large, sharp-sterned, schooner-rigged canoe, and originally was substantially a dugout, being made of a number of logs treenailed together, which were shaped to the requisite form, both inside and out. More recently, however, the bugeye is regularly built, like any other vessel of its size. While some vessels of this type have an ordinary boom and gaff schooner rig, a two-masted leg-of-mutton rig is most in favor. This is most remarkable because of the excessively strong rake of the masts and the fact that the foremast is much longer than the mainmast, while the latter stands comparatively close to the stern. The bugeye usually has very fine lines, and is a swift sailer, close hauled, though it is at a disadvantage in running free, especially in light winds, since the strong rake of its masts prevents the sails from doing such effective work as they might otherwise do. With a more modern rig the Chesapeake bugeye would be among the swiftest vessels of its size engaged in the fisheries.

The whale ship, which has now disappeared from the seas, had certain peculiarities not ordinarily found in vessels designed for the merchant service. An important feature in a whaler was to build her so that she would be what is termed an "easy cutting-in ship." Consequently the average whaler was somewhat narrower, rather sharper on the floor, and had an easier bilge than vessels designed for the merchant service alone. It is also true that speed in the whale ship was a highly requisite quality; consequently many of the vessels built for this industry, even in the thirties, had fine, easy lines under water and were excellent sailers, though their full, round bows at the rail line and heavy, square sterns had no suggestion of speed to the casual observer. Whale ships are proverbially long lived, unless wrecked or destroyed by ice, and because of this and the continued employment of ships of venerable years some have accepted the fallacy that vessels of this class were awkward tubs, only fit to drift slowly about the ocean. However, comparatively late additions to the fleet were clipper vessels of the most pronounced type, and one of the models in the collections is that of a whale ship which could not be overtaken by a Confederate steam cruiser until the wind failed her.

The collection of rigged models represents the most important types of fishing vessels employed in the United States, as well as many others which are historically interesting from having been used in earlier periods, and which serve to trace the development of naval architecture as applied to the fisheries in America.

A series of sketches, line drawings, photographs, and paintings illustrate the construction, rig, and general appearance of the vessels, more especially the fishing schooners of past and present periods; these are represented under varying conditions of wind, weather, and surroundings.

The fishermen of the United States, until within a comparatively short time, have shown a decided preference for sharp-sterned boats, a preference which is very general among the fishermen of all countries. And even at the present time this type of fishing boats is, perhaps, in most general use in American waters. At the same time, however, various forms and rigs of square-sterned boats have been adopted by the fishermen within the present century, and most of these have met with local favor at least, while others have become so celebrated for speed that their fame has extended far and wide. It is a somewhat remarkable fact that the most popular forms of small yachts on the Atlantic coast have been modeled and rigged like fishing boats, and it is by no means an unknown event for fishing boats to engage in regattas and carry off the honors of the occasion. The cat-rigged fishing boats in the vicinity of Newport, R. I., and Marthas Vineyard, Mass., and the small sloops of southern New England and of Maine furnish the favorite types for yachtsmen to copy. Both of these forms have gained a wide celebrity for speed both in the United States and in other countries. In England the catboat of this type is known as the "Una" boat, this special form having taken its name from the American boat *Una* which, some years ago, created a great sensation in British yachting circles by her wonderful performances.

The cat rig, the sloop, and the schooner are the favorite rigs among the native American fishermen. The cutter rig has been introduced by the Irish fishermen sailing from Boston, Mass., while along some parts of the coast of the Gulf of Mexico and in California the fishermen, many of whom are natives of southern Europe, have brought with them their native prejudices in favor of the lateen rig. The lug rig has never been a favorite one in the United States.

There are many varieties of flat-bottomed boats used in the fisheries of the United States, the most important of these being the American "dory." For various reasons this type of boat, though somewhat unprepossessing to look at, has come into great favor for sea fishing.

The dory is found more convenient for stowage on the deck of a vessel than any other boat, since several can be "nested" together; it is light and convenient to handle, "burdensome," can be built at small cost, and is one of the safest boats used in the fisheries. At least three dories have crossed the Atlantic, one of which, the *Little Western*, was only 13½ feet long on the bottom.

The dory originated in Newburyport, Mass., about the beginning of the nineteenth century. At first boats of this build, but of larger size than those employed in the fisheries, were used as lighters for discharging cargoes of sugar and molasses from vessels arriving from the South or the West Indies. Dories were used in the fisheries comparatively little until 1850, but with the introduction of the trawl-line fisheries these boats came rapidly into favor and of late years have been very generally adopted by the fishermen of the British Provinces of North America and also by the French, who resort to the Grand Banks of Newfoundland.

The "sharpie" used in the oyster and other fisheries is a very serviceable form of boat in localities where the waters are generally shallow. Provided with centerboard and sails, they are frequently swift sailers in smooth water, and on certain parts of the Atlantic coast boats of this type are in high favor as small yachts.

The "pound boat" of the Great Lakes is a variation of the "sharpie" pattern, but is made of extra width in order that it may be adapted to its work. As a matter of fact, a fisherman's boat is usually as good an illustration of the adaptation of means to ends as can be found. The Eskimo of the far north, where wood is not obtainable, builds his "kaiak" or "bidarka" of the skins of such animals as he can capture. The tribes living on the northwest coast of America, in regions where forests of large trees grow, construct for themselves boats dug out of the solid wood, while other Indians make boats of the bark of trees, birch bark being the favorite material among many North American tribes. Among white men we find even a greater diversity. And in a country having such an extensive area as the United States, with all the varying conditions of climate, weather, and local surroundings, having within its limits fishermen from almost every country under the sun, it is not at all surprising that a remarkable variety of form and rig should exist in fishing boats.

North America stands prominent among all countries of the globe both for the number and variety of skin boats, employed chiefly by the natives of the far north. In building these the aborigine has not only demonstrated an ability to apply means to ends but he has exhibited a skill in design and construction which is most remarkable. Force of circumstances has compelled the northern savage to build a boat well adapted to his needs and which at the same time stands as a prototype of the white man's racing scull and combines a symmetry of design with a fitness for its purpose which may well cause wonder on the part of those who have spent years of study and scientific research in reaching the same result.

So far as known and so far as represented by the collections, only one type of "coracle" was used in North America. This was made by Indians in a region where formerly the buffalo roamed in undiminished numbers. The skins of this animal furnished the covering, which stretched over a light framework made of boughs or saplings took the form of a bowl-shaped boat, extremely light in weight, which was easy of portage and well adapted to crossing streams or other small bodies of water.

No part of the world is more favorably situated for the construction of skin boats than Alaska. Its almost innumerable islands and its long stretch of seacoast render boats of indispensable necessity, while its herds of sea lions, seals, and walrus furnish in their skins the material for construction.

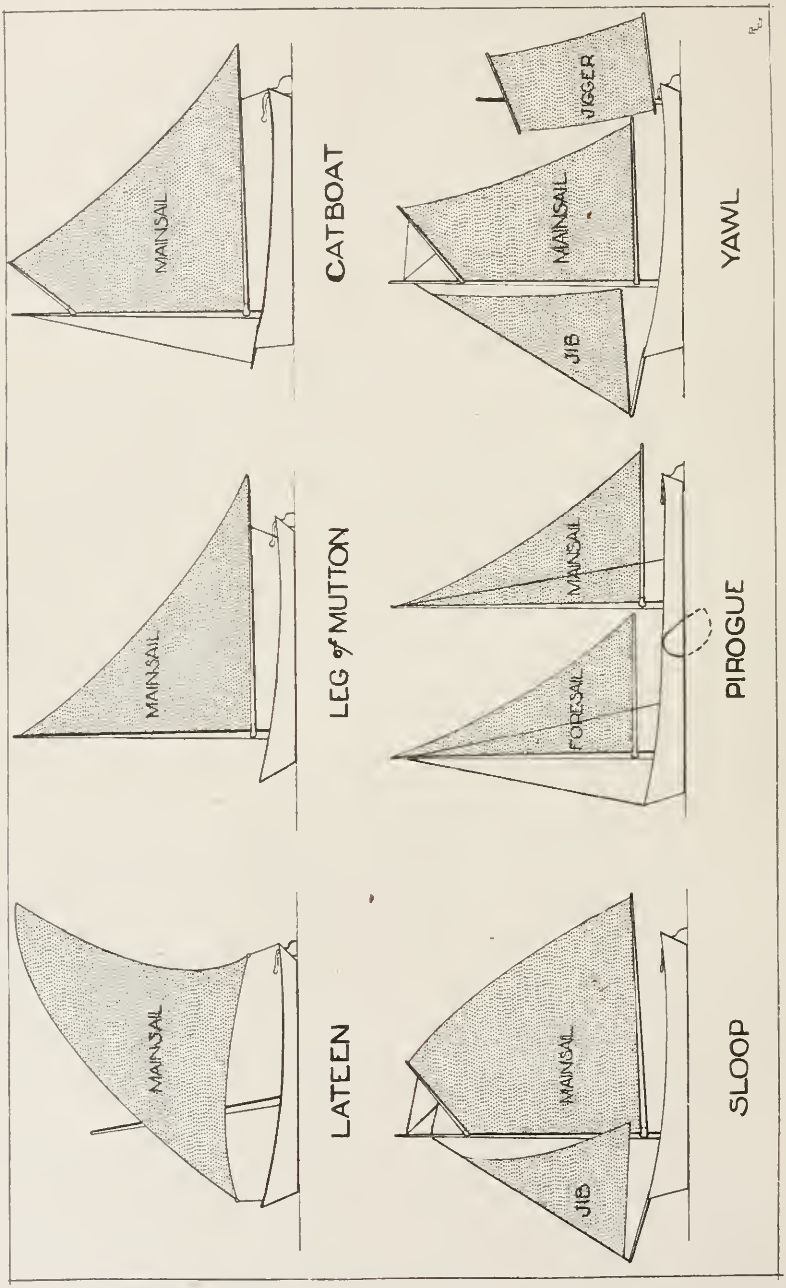

MAINSAIL
LATEEN
MAINSAIL
LEG of MUTTON
MAINSAIL
CATBOAT
JIB
MAINSAIL
SLOOP
FORESAIL
MAINSAIL
PIROGUE
JIB
MAINSAIL
JIGGER
YAWL

FIG. 2.—SAIL PLANS OF THE MORE COMMON TYPES OF SMALL SAILING VESSELS.

The "kaiak" with the single manhole is doubtless the typical original skin boat of northern North America. There are many kinds of these, showing a varying fancy in designers of different localities, though many of them have an intimate relation. With one exception, the Greenland kaiaks are substantially all of one type. The skin boat, however, of the most northern inhabitants of Greenland is essentially the same as the boats built by the Eskimo in the Hudson Bay region, notably at Hudson Straits and Ungava Bay. This would seem to indicate that originally the skin boat of eastern North America was of this type and that the more symmetrical and better-finished product, now commonly found on the west coast of Greenland, may in part at least be due to the influence of contact of the natives with white men.

The kaiak of the Mackenzie River region which, following the coast line, is approximately midway between Davis Strait and western Alaska, combines the flat bottom of the Hudson Bay boat with the pointed ends of the west Greenland type, though the ends rise more abruptly and are more attenuated.

The kaiaks of extreme northern Alaska—at Point Barrow and adjacent regions are substantially of one type, though some have flat bottoms while the majority are round beneath. These are long, narrow, and straight on top with pointed ends, closely resembling in appearance the single-handed racing scull of the white man. Farther down the coast, beginning at St. Michael or vicinity, the kaiak has less length and greater beam, with a sharply ridged deck and larger manhole, and though it varies in details it is substantially of one type as far south as skin boats are used.

In the Aleutian group the skin boat is called a "bidarka," a name derived from the Russians, and applied indiscriminately to canoes with one, two, or three manholes. The single-hole bidarka is essentially the same as the single-hole kaiak of the Eskimo south of St. Michael, differing from the latter chiefly in having a cleft bow.

Some investigators believe that this was the only type used in Alaska when the country was first discovered by the Russians, while others contend that the bidarka with two manholes was a necessity to the Aleut, who, it is stated, could not successfully pursue and capture the sea otter in open water without a double-hole boat in which two men could go. However this may be, it is generally conceded that the three-hole bidarka is a result of the white man's influence, and was originally built for the transportation of Russian traders along the coast and among the islands where they went to purchase furs.

The bidarka is in all essential particulars a variety of kaiak, and, with the exception of some having more than one manhole, its differentiation from the Eskimo type is less marked than that between types of skin boats used by the Innuits.

The larger open skin boat, known to the northern Eskimo as "oomiak" or woman's boat, and to which the Aleut applies the Russian name of "bidarra," is in common use from the extreme north to the Aleutian Islands, being employed largely for transportation, but also, in some sections, serving a useful purpose for the capture of whales, walrus, etc. Where the walrus is taken, its skin is prized chiefly for building the oomiak, for which purpose the hide is split in a most deft and skillful manner.

These boats vary materially in size, ranging from about 20 to upwards of 50 feet in length. Some of the largest are used for transportation on the Yukon, on which river they carry large freights.

General reference has already been made to the skin boats of British America. These are employed chiefly in northern Labrador, notably in the Hudson Bay region, and in the vicinity of the Mackenzie River.

Mention has been made of the Greenland kaiak which, in its best form, excels in beauty and symmetry as well as in finish all other skin canoes of North America.

The Greenland oomiak or woman's boat bears a close resemblance to its prototype of the west coast of North America, from which it differs in no essential particular. Indeed, while there are marked differences of form and structure, so far as the kaiak is concerned, the oomiak suggests a common origin; and there seems no reason to doubt that its design, as well as its method of construction, has been carried from one portion of Arctic America to another, and, though these ideas may have been disseminated centuries ago, they are still adhered to with a faithfulness which indicates the appreciation felt by the Eskimo for a boat which it would be practically impossible to excel, if we consider the purpose for which it was built.

In those regions of North America where the birch tree abounds its bark has been extensively utilized for the building of boats, to which purpose it is eminently adapted, since it is light, elastic, and, with care, very durable. The skill attained by the Indian in the building of birch canoes is as remarkable as that of the Eskimo in constructing skin boats. For it is not simply the fact that the aborigine devises a means of flotation, but that at the same time he constructs a fabric which challenges our admiration for its symmetry and its adaptation to the purpose for which it was designed. In all the field of naval architecture it is difficult to find a boat which in design and construction in so high a degree combines lightness, buoyancy, strength, and speed.

Originally the birch-bark canoe was one of the most widely used boats in that section of North America embraced under the head of the United States and its territories. The material of which it is formed was easily obtained in what is now the northern part of the United States and also in Alaska, practically to the northern limit of the timber belt. Consequently the birch canoe was in use from the Atlantic to the Pacific and is still markedly in favor with the remnants of Indian tribes located in northern States and also with the Indians of that part of Alaska where birch bark is obtainable.

While there is a general similarity in the form of the birch-bark canoe, there are marked specific differences in sections remote from each other. These are indicated in the descriptions and need not be discussed here.

In all essential features the birch-bark canoes of British North America are similar to those of the United States, already referred to. The canoe of the Mic Mac tribe of Indians on the Gulf of St. Lawrence and of the mountain Indians of Labrador is practically the same as that built by the Indians of eastern Maine, while it is but natural that the natives living along the northern lakes should have boats similar to those built and used by neighboring tribes or members of the same tribe in the United States. In like manner, the canoes of northern British Columbia are in most respects similar to those used by the natives of Alaska.

Only one form of balsa is found in North America so far at least as the collection shows. It is made of grass or rushes. The general abundance of other material for boat building in nearly all sections of North America is, perhaps, the reason why balsas are limited to one locality and one type.

The abundance of timber in North America suitable to the construction of dugout canoes has naturally resulted in inducing the Indians of many sections of the continent to build boats of this kind; and in no part of the globe, perhaps, is the dugout canoe more extensively used or brought to a higher state of perfection. When America was first settled the dugout canoe was found in common use in many sections along the Atlantic coast of that part of the continent now embraced within the limits of the United States. At the present time few boats of this description are employed by eastern Indians, though in Florida and Virginia canoes are still built by the aborigines. In the extreme northwest of the United States, however, and in Alaska, the dugout canoe is brought to a high state of perfection, and is employed by certain tribes of coast Indians, practically to the exclusion of all other types of boats. In early days it was not uncommon to build canoes of large dimensions for war purposes, but the changed condition of the Indians in recent years renders the construction of such craft unnecessary; consequently they are not built now.

The marked feature of the dugout canoe of the northwest coast is the easy symmetry of its lines and the fact that it is built on approved scientific principles for easy passage through the water. In this particular it challenges admiration and suggests that the predatory habit of the savage has been an important factor in enabling him to produce a boat which is equally well adapted to escape from a stronger foe or to overtake an enemy of which he is in pursuit. At the same time it is preeminently well adapted to the pursuit of marine animals, such, for instance, as the fur seal and the sea lion.

The canoes of British North America embraced in the collection are chiefly those of the northwest coast and so closely resemble the dugouts of Alaska that it is generally impossible to distinguish them apart. Therefore no extended discussion of them seems necessary.

SOUTH AMERICA.

Under this head is a varied, though not extensive, collection of aboriginal types of boats used in various parts of South America, including dugouts, bark canoes, grass balsas, etc.

EUROPE.

Considering the immense preponderance of the merchant and naval marine of Great Britain and her western colonies the material in the Museum which comes under this head can be considered nothing more than a limited nucleus around which may be gathered a large aggregation of material that necessarily must prove both interesting and instructive.

The fishing vessels and boats of Germany, of which are several excellent rigged models in the Museum, have peculiar characteristics. They are quite unlike the boats of other countries and afford material for interesting study. The detailed descriptions obviate the necessity of further discussion here.

With one exception the illustrations of Dutch craft are confined to engravings or photographs. For centuries Holland has been famous for her vessels and boats which at one time marked the limit of advance in Europe.

Belgium has only a limited variety of fishing boats, and aside from the larger craft, such as cutters, the rigged model in the museum shows the most important type, and practically the only one of consequence employed from that country.

The fishing boats of Denmark are chiefly, if not wholly, sharp-sterned craft, and mostly of small size. The two models in the museum are those of the most important types.

Norway is noted because, at a very early age, the Norsemen became famous builders and navigators, producing vessels remarkable for strength and symmetry, in which they not only cruised along the coasts of Europe but crossed the Atlantic. A study of the beautiful model of the Viking ship will prove valuable and instructive to everyone having an interest in naval architecture. Norway has a large number and variety of fishing vessels and boats. While, however, many of its vessels have square sterns, its fishing boats are, with very few exceptions, sharp aft, and more or less closely resemble the Viking ships, built a thousand years ago or more—an emphatic demonstration of the wonderful results attained in designing by the early Norsemen, and also of the conservatism of their successors.

While some of the fishing craft of Sweden resemble those of Norway, in a general way at least, the majority have peculiarities of their own, which will be best understood by a study of the models.

ASIA.

The vessels and boats under this head present many features of special interest, which might be dwelt upon at length if space and time permitted, but the limitations placed upon these explanatory notes preclude the possibility of anything beyond the barest allusion to some of the more prominent features.

Natives of Ceylon have been among the most prominent of eastern races in developing a boat having the highest possibilities of speed. The Singalese outrigged canoe, of which a description is made subsequently, has been especially noted by American and European sailors and travelers who have visited the island, and its construction indicates a genius for naval architecture so far as the attainment of speed is concerned, which may well be the occasion of surprise and admiration. Apparently the excellencies of the outrigged canoe, which is substantially a dugout, are so highly valued by the Singalese that they have shown a desire to use dugouts in whole or in part in the construction of other craft, this being a marked feature of their boat building.

As a rule, the vessels and boats of the region under consideration indicate much skill on the part of the designers and builders in producing craft in which speed is an important factor. By instinct and training, the Malay has been a pirate for many centuries, and his predatory habits have led him to exercise much intelligence in developing forms of boats or vessels suited to his purpose. While he may have come short of the highest attainment, it is, nevertheless, remarkable that he learned to perfection the wave-line theory probably centuries before its demonstration by Froude and others who revolutionized ship designing in Europe. No sailor who visited the eastern seas in the early days of oriental commerce but had a dread of the speed of the flying "prahu" that swarmed about the islands of the Eastern Archipelago and lay in wait to prey upon passing ships. But, while the majority of these craft have features markedly original, there is evidence in some of the influence of European naval architecture. This is seen in a peculiar form of prahu from Borneo, which, in its high poop deck at the stern and the projection at the bow, resembles closely the Spanish caravels such as those on which Columbus sailed to America. And it may not be an error to infer that these features of construction have been copied from the caravel, wrecked or captured at the locality where this type of vessel is now built.

Many of the boats of Bombay have features which have been referred to as characteristic of those used by the natives of Malacca and the adjacent islands, but somewhat more highly specialized or at least brought to a higher degree of perfection and symmetry. The majority of the Bombay craft are notable for their sharp and easy wave lines and for a shape well adapted to easy passage through the water. One of the most marked departures from this is the "muchva," a type in which the overhanging bow and easy section lines are very pronounced, indicating that the oriental builders long ago learned the advantage of having a sailing boat in which these characteristics are embodied. The "muchva" is reputed to be the swiftest boat in eastern seas which is not provided with an outrigger, and some writers claim that it was even faster than English yachts. However this may be, there is no question but what the natives of Bombay have attained much skill in designing sailing boats.

The boats used by the natives of the Laccadivas and Maldives are, many of them, small, crude, sharp-ended dugout canoes, carrying very large sails.

A marked feature of boat construction at these islands is the fact that the craft which are planked have their planks sewn together and lashed to the timbers, instead of being fastened by nails or wooden treenails, as is common elsewhere. This ancient method of boat building is believed by those who practice it to insure greater elasticity, and altogether to be more serviceable than to fasten a boat with metal.

Generally speaking, the boats of Madras, at least so far as they are represented in the collection, are primitive in construction and indicate little advance by the natives of that presidency in the art of naval construction as applied to the fisheries and ordinary coast transportation. Rude and primitive dugouts and catamarans are common, though it must be conceded that the catamaran serves a most useful purpose for surf work where an ordinary boat can not be utilized.

The Masula boat, built for transportation of passengers and freight to and from ships lying in an open roadstead, is one of the curious productions of East Indian naval architecture. The detailed description elsewhere renders unnecessary more than a passing allusion here.

The boats of Bengal, like those of Madras, are, many of them, crude dugouts, some of which are chiefly remarkable for the manner in which they are used. The collection from the Bengal Presidency, however, include Shola swimming floats. These constitute one of the most primitive appliances for flotation which man has ever used, and in one direction at least furnished the starting point, the very beginning, of man's effort to secure the means of support in or on the water.

The boats used on the rivers and inland waters of Kashmir present in their construction another most interesting phase of oriental naval architecture. Although built in the simplest form, with flat bottoms, narrow ends, and nearly vertical sides, the easy curve given to the bottom, which rises with a long overhang at each end, makes possible its easy passage through the water, notwithstanding the sharp angles on the sides. It may be worthy of note in this connection that one of the most successful small yachts in the United States during the season of 1895, the little single-hander, *Question*, of approximately 15 feet length on the water line, was built substantially on the principle embodied in the Kashmir boats, so far at least as form is concerned. While sails are not used on these river craft of Kashmir, it follows, as a matter of course, that it is of much consequence to secure a form which, while having a light draft, will pass easily through the water.

The representations of Japanese merchant "junks" apply to types of vessels in use some years ago, when the size as well as the construction of merchant vessels was limited by law. In recent years Japan has made many advances in all that pertains to commerce, and the junks of several decades ago are interesting chiefly from an historical standpoint.

The fishing boats of Japan are numerously represented by models. They are, practically without exception, flat-bottom craft, which, for certain reasons stated elsewhere, are preferred by the Japanese.

The models of Chinese war junks in the collection represent types of vessels still in use in China in 1876. In more recent years, as late events have demonstrated, China has built a fleet of warships of the most approved types, several of them being armored vessels. The sailing junk is no longer depended upon, even by China, as a means of offense or defense, particularly in case of war with enlightened nations.

Many curious forms of junks and cargo boats are employed in China for trading along the coast or on the rivers. Generally speaking, these are of crude construction, though some of the junks are well built and are credited with considerable speed under sail.

The majority of fishing boats used in China partake largely of the characteristics of the junks, while some of them differ in no essential particular from vessels employed for carrying freight. However, dugout canoes and catamarans, the latter made chiefly of bamboo, are used to a considerable extent.

The houseboat has been brought to a high state of perfection in China, and in no country in the world has it been so extensively utilized. The enormous population of the country has resulted in causing thousands, or perhaps tens of thousands, of people to make their homes upon the water. For this purpose they provide themselves with houseboats, and at many of the large ports there are floating towns on the surface of the harbors or rivers.

PACIFIC ISLANDS.

It is not possible to discuss at length the characteristics of the boats of the Pacific Islands, of which there are several specimens in the Museum. It must suffice to say that, almost without exception, the islanders have adopted the outrig type of canoe, some of which are dugouts and others are built by fastening together irregularly-shaped pieces of wood. But, however constructed, the important fact remains that these boats are remarkable for their speed under sail or when propelled by paddles. They afford an interesting study as illustrating the adaptation of means to ends. Ordinarily the islands do not produce timber sufficiently large to make a wide dugout, but the savage has solved the problem of stability by providing his boat with outriggers, to the ends of which is attached a balance log, which is to his canoe what the lead keel is to the modern racing boat, which has recently reached such a high state of development.

There is much variety in the canoes of the Pacific Islands. Sometimes two boats are attached together by a platform, by which means the stability is increased, and, with a huge sail, craft of this kind, which are sometimes termed catamarans, attain a wonderful degree of speed.

PART 1.

DESCRIPTION OF VESSELS AND BOATS OF NORTH AMERICA.

GOVERNMENT VESSELS OF THE UNITED STATES.

Block model of double-turreted monitor.

The United States double-turreted monitor *Miantonomoh* was built from this model by John Roach & Sons at Chester, Pa., and was launched on December 5, 1876. Subsequently she underwent extensive alterations, and was completed at the New York Navy Yard. Went into commission on October 27, 1891.

An iron, compound armored, double-turret warship, of the improved monitor type; long, convexly sharp bow; low floor; easy bilge; moderately long gunwale; two turrets, each with two 10-inch breach-loading rifles; conning tower, etc.

Dimensions of vessel.—Length between perpendiculars, 251 feet; on water line, 259 feet 6 inches; beam, extreme (over armor), 58 feet 10 inches; draft of water, 14 feet; tonnage, 1,276; displacement, 3,990 tons; side armor, compound, 5 inches and 7 inches thick; thickness of plates on the two turrets, 11½ inches. Armament: Four 10-inch breech-loading rifles; two 6-pounder rapid-fire guns; two 3-pounder rapid-fire guns; and two 1-pounder rapid-fire guns. Indicated horsepower, 1,600; speed, 10½ knots; coal capacity, 300 tons. Scale of model, one-third inch equals 1 foot.

This vessel, like all the monitor type, has very little free board; in action offering a small target for an enemy's projectiles. She was intended for a coast-defense vessel only, therefore speed and coal endurance are secondary to offensive and defensive power. Her light draft would enable her to choose a position where she could not be closely approached by the heavy-draft armored vessels of an enemy. At the time she was designed she was one of the most powerful warships in the world. But the rapid improvement in building naval ships rendered changes necessary, hence the delay in her completion.

Deposited by John Roach & Sons. Cat. No. 160,137 U.S.N.M.

Block model of launch.

The steam launch that was used by Commander W. B. Cushing, United States Navy, to blow up the Confederate ram *Albemarle* was built from this model. It was designed by D. J. Lawlor, of Chelsea, Mass., in 1862.

This was a wooden, single-screw steam propeller launch with sharp bow: only slight rise to floor; very short turn to bilge; long, easy run; nearly plumb square stern; medium sheer.

Dimensions of launch.—Length over all, 34 feet; beam, 7 feet 6 inches; depth, molded, 3 feet 7½ inches. Scale of model, 1 inch equals 1 foot.

Mr. Lawlor has said that several steam launches were built for the Navy from this design in 1862, under the supervision of Admiral Boggs, United States Navy. One of these was the launch used by Cushing. The boat had no special features but was the ordinary naval launch of that period. After being selected for the perilous undertaking, she was fitted with special appliances for operating the torpedo with which she blew up the *Albemarle*. This vessel was built on the Roanoke River in Halifax County, Va., and armored with iron. She was 152 feet long between perpendiculars; her extreme width was 45 feet; her depth, 9 feet. When launched she drew 6½ feet of water, but after being ironed her draught was about 8 feet. She was armed with two rifled Brooke guns, each working through three portholes as occasion demanded.

Gift of D. J. Lawlor. Cat. No. 76,044 U.S.N.M.

Model of United States Bureau of Fisheries steamer.

The iron twin-screw steamer *Albatross*, designed by Charles W. Copeland and built for the United States Fish Commission in 1882 by the Pusey & Jones Co., of Wilmington, Del.

This vessel, designed and constructed for the purpose of deep-sea exploration, was equipped with all modern appliances used in such work. The hull is formed so as to go astern safely in a seaway while sounding and dredging. The rudder and its attachments are of extra strength, and, in addition to the hand and steam steering gear in the pilot house, there is a powerful screw gear attached directly to the rudder head, a heavy iron tiller on the poop deck for relieving tackles, and the usual rudder chains. The type of machinery and the various appliances were selected with a view to the special work for which she is intended.

An iron, brigantine rigged, twin-screw steamer, with sharp flaring bow; low floor; easy bilge; wall side; moderately long and well-shaped run; overhanging round stern; six transverse iron bulkheads and six water-tight compartments; poop cabin extending 30 feet forward of sternpost, entire width of the vessel; deck house, 83 feet in length, 13 feet 6 inches wide, and 7 feet 3 inches high from deck to deck, built of iron from the funnel aft and sheathed with wood inside and out, with iron storm doors; from funnel forward it is of wood. Topgallant forecastle 44 feet in length and 6 feet 3 inches in height from deck to deck.

Dimensions of vessel.—Length over all, 324 feet; length at 12-foot water line, 200 feet; beam, molded, 27 feet 6 inches; depth from top of floors to top of deck beams, 16 feet 9 inches; displacement (on 12-foot draft), 1,000 tons; net register tonnage, 400. Scale of model, one-half inch equals 1 foot.

From the time she was built until the autumn of 1887 the *Albatross* was engaged in deep-sea explorations along the Atlantic coast, from the Caribbean Sea to the banks of Newfoundland. In the winter of 1887–88 she cruised along the east coast of South America, passed through the Strait of Magellan, and up the west coast to San Francisco. Since that time she has been engaged chiefly in explorations in the Pacific and Bering Sea.

Deposited by the Bureau of Fisheries.

Cat. No. 160,414 U.S.N.M.

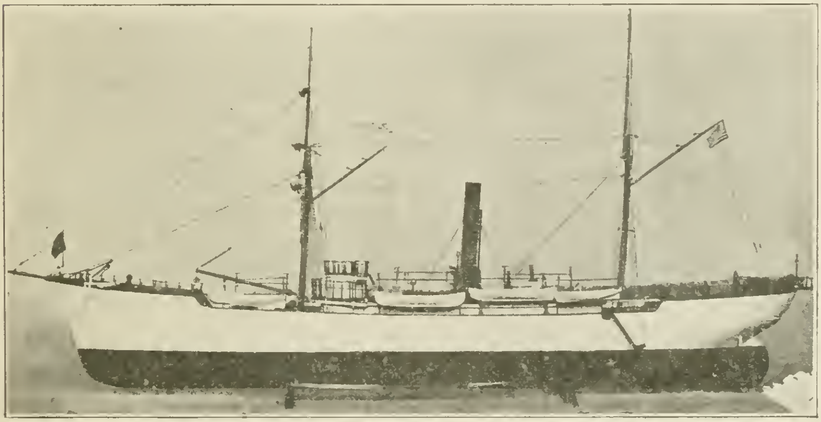


FIG. 3.—U. S. BUREAU OF FISHERIES STEAMER "ALBATROSS."

Model of United States Bureau of Fisheries steamer.

The steamer *Fish Hawk* was built for the United States Fish Commission in 1880 by the Pusey & Jones Co., of Wilmington, Del. She was designed by Charles W. Copeland, consulting engineer of the United States Lighthouse Board, and was constructed for the combined purposes of fish hatching and dredging. When hatching fish it is necessary at times for her to enter the shallow waters of rivers, bays, and sounds along the coast. Therefore she has been given a light draft, which makes her unsuitable for long sea trips.

The *Fish Hawk* is a twin-screw propeller, rigged as a fore and aft schooner with pole topmasts. Her hull below the main deck is of iron, sheathed with yellow pine from 2½ to 3 inches thick, calked and coppered. Above the main deck the structure is of wood. There is a hurricane deck extending from stem to stern and from side to side.

on which are located the pilot house, captain's quarters, and laboratory. She has five iron bulkheads, all of which, with one exception, are water-tight.

Dimensions of vessel.—Length over all, 156 feet 6 inches; from rabbet to rabbet, on the 7-foot water line, 146 feet 6 inches; beam molded, 27 feet; depth of hold, 10 feet 9 inches; sheer forward, 4 feet 4 inches; sheer aft, 1 foot 9 inches; mean draft, 6 feet 5½ inches. Scale of model, one-half inch equals 1 foot.

In the fore hold under the steerage and storerooms are the water tanks, having a capacity of 800 gallons. The boiler, coal bunkers, firerooms, and engines are located between bulkheads Nos. 3 and 4, abaft of which is the lower cabin, 26 feet long, with seven open bunks on each side, and including the dispensary, linen room, pantry, and storeroom.

On the main deck the forecastle extends 31 feet aft from the stem and is succeeded by the main or hatching deck which is 47 feet long. The latter has on each side a gangway port abreast of the foremast, 6 feet wide and extending from deck to deck, and four large swinging ports.

The boiler hatch occupies the after part of this deck, and is raised about 9 inches above it. On the hatch are placed the donkey pump and distributing tanks for the hatching apparatus, which is arranged around it. When engaged in dredging, the hatching apparatus, excepting the pump, is entirely removed from this deck, and it becomes the working quarters of the naturalists. The beam trawls and dredges, which are manipulated from the upper deck, are passed in at the gangway port on the starboard side, their contents emptied into sieves and washed, and then transferred to swinging tables, where they are sorted, examined, and studied. The arrangements for this class of work are very convenient, and the working space ample. With all the ports open on both sides, the deck receives an abundance of light. The donkey pump is used for washing the materials emptied into the seives.

Abaft the hatching deck comes the donkey boiler room and galley, the engine room and cabin pantry, and finally the cabin, followed by the small after deck in the stern, which is about 14 feet long. The cabin is abaft the engine room, is 30 feet long, and has four rooms on a side, with one bunk in each.

Aft, on the starboard side, is the fish commissioner's office. The lower cabin companion way is amidships, and a bathroom and closet on the port side.

On the hurricane deck, forward of the foremast, are the hoisting and reeling engine and dredging boom, the heel of which is attached to the mast. There are four small boats, one of which is a steam cutter, of the Herreshoff pattern, with a coaling capacity for

28 hours' steaming at 6 knots an hour. The vessel is fitted with a hoisting engine used for dredging purposes, having two cylinders, 8½ inches in diameter and 9 inches stroke of piston, with cranks at right angles.

The *Fish Hawk* has been used for hatching shad in the spring and for dredging purposes during the summer months. For the first three years after she was built her principal field of exploration was the inner edge of the Gulf Stream slope, off the southern coast of New England, down to depths of over 700 fathoms. More recently she has explored the oyster beds and other inshore areas along the coast.

Deposited by Pusey & Jones Co. Cat. No. 39,422 U.S.N.M.

Model of United States Bureau of Fisheries schooner.

This vessel known as the *Grampus*, has been used for collecting sea fish for fish-cultural purposes, and for prosecuting various scientific researches at sea in which the fish commission has engaged since she was built. She was designed by and built under the supervision of Capt. Joseph W. Collins, formerly of the United States Fish Commission. She was launched at Noank, Conn., in the spring of 1886, and went into commission on June 5 of that year.

The *Grampus* is a wooden, carvel-built, keel schooner; with long, sharp bow; concave water lines; stem straight and nearly vertical above water; strongly curved below; deep keel, rockered at ends; moderately sharp floor; quick turn to bilge; slightly tumbling in at top side; long, well-formed run; straight, nearly vertical sternpost; deep, overhanging, strongly raking stern; fine sheer; long quarter-deck; cabin house aft; forecastle under deck forward; fitted with hatches, etc. Rigged as a two-masted, double topmast schooner, with all light sails set as follows: Mainsail; main club topsail (working topsail clewed down on mast head; foresail; maintop mast staysail; jib-headed foregaff topsail; fore staysail; jib; and large jib topsail. (With rare exceptions the working maintop sail and small jib topsail are used instead of balloon sails.)

Dimensions of vessel.—Length, over all, 90 feet; between perpendiculars, 81 feet; beam, 22 feet 3 inches; depth of hold, 10 feet; registered tonnage, 83.30. Scale of model one-half inch equals 1 foot.

The *Grampus* was built at Noank, Conn. She is provided with a well located in the middle of the vessel in which fish and marine animals can be kept alive, and taken from distant fishing grounds to the coast stations of the bureau, for fish-cultural purposes or to serve as objects of study and research for biologists. In other important respects she is arranged and equipped to adapt her to carrying on the marine researches and investigations, which are being continuously prosecuted by the bureau.

An important object sought in her design was the production of a new type of fishing vessel—one that would be much safer and in other respects better adapted to successfully meet the exigencies which must be met by schooners employed in the ocean fisheries. In model and rig she is a radical departure from vessels engaged in the New England fisheries prior to her advent, and her superiority in safety, speed, and other desirable qualities has been fully established.

She differs from the typical fishing schooner in being 18 to 24 inches deeper; in having 6 to 10 inches less beam, and an easier aftersection. She has less proportional width aft; greater rake at stern; and pilot-boat bow, with straight stem above water. Her extreme draft is 11 feet.

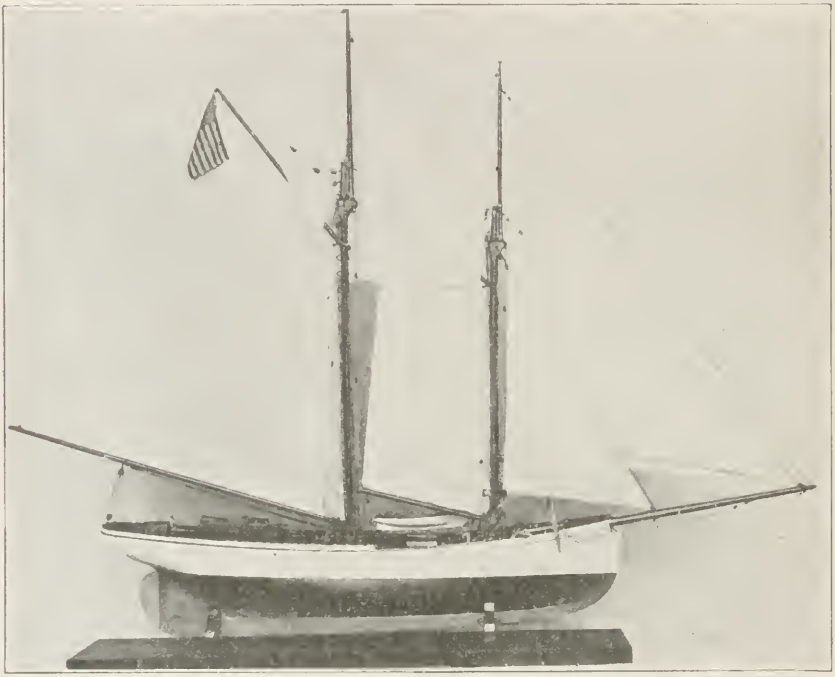


FIG. 4.—U. S. BUREAU OF FISHERIES SCHOONER "GRAMPUS."

The principal features of the *Grampus* have been copied by New England builders. Nearly all of the fishing vessels recently built are deeper than formerly, and many of them have straight stems. The spirit of improvement has received such an impetus that the best skill of the most eminent naval architects has of late been devoted to designing fishing vessels.

Deposited by the Bureau of Fisheries. Cat. No. 76,259 U.S.N.M.

Model of schooner.

The schooner *Flying Fish* was one of the squadron of vessels of the Wilkes exploring expedition, which sailed from the United States in 1838.

This was a wooden, carvel-built, two-masted, keel schooner, with moderately sharp bow, somewhat strongly convex at top, but much finer below; raking curved stem; no head; sharp floor extending above water line; long lean run; square stern; moderate sheer; cockpit aft; deck forward of cockpit nearly flush with rail, except for the bow chock forward and the low quarter rail aft of main rigging.

Dimensions of vessel.—Length over all, 85 feet 6 inches; beam, 22 feet 6 inches; tonnage, 96 tons old measurement; bowsprit, outside, 30 feet; foremast, above deck, 68 feet 3 inches; fore-topmast, heel to truck, 32 feet; foreboom, 27 feet; foregaff, 26 feet 3 inches; mainmast, above deck, 69 feet; maintop mast, 34 feet 6 inches; main boom, 57 feet 6 inches; main gaff, 29 feet 3 inches. Scale of model, about one-sixteenth inch equals 1 foot. The model was made by one of the sailors of the expedition and is believed to be a fairly accurate representation of the vessel.

This schooner was originally the pilot boat *Independence*, of New York, but was renamed the *Flying Fish* after being purchased as a tender for the Wilkes expedition. Her rig was reduced before sailing. She was probably built about 1830 to 1835, and represents the style of vessel—with "cod's head and mackerel's tail"—used by the New York pilots of that period. On the southern cruise, while under the command of Lieut. William M. Walker, she reached the highest southern latitude of any vessel of the Wilkes expedition. She is referred to in "Thulia. A Tale of the Antarctic," by J. C. Palmer, United States Navy, New York, 1843.

The *Flying Fish* was condemned at Singapore, after four years' service on the expedition, as unfit to continue her voyage, and sold for $3,700. Wilkes says of her: "As a vessel of her class, she was almost faultless."

Deposited by Mrs. E. H. Du Hamel. Cat. No. 76,317 U.S.N.M.

MERCHANT VESSELS.

STEAMERS.

Model of James Rumsey's steamboat.

The boat and machinery were invented by James Rumsey, of Berkley Springs, Va., in 1784, and experimented with in the following year.

James Rumsey, who invented this device for propelling a boat by drawing in water at the bow and ejecting it forcibly at the stern by means of a steam pump was a working bath tender at Berkeley Springs, Va. In 1784 he constructed a crude model of a steamboat for ascending rivers against the current. This he exhibited to a group of people who visited the Springs at that time, among whom was General Washington. Subsequently, Rumsey built a boat for testing his device, the boilers and machinery for which were made by the Catoctin Iron Furnace, of Frederick County, Va. An experimental trip was made with this steamboat on the Potomac River in 1785, which is said to have been successful. This encouraged him so much that he destroyed his model "and sailed for England, hoping thereby to perfect his work and realize fame and fortune; but he was doomed to disappointment, and after several years of very hard struggling he died before completely and satisfactorily demonstrating the principles of a new model."

Made in the Museum. Cat. No. 203,711 U.S.N.M.

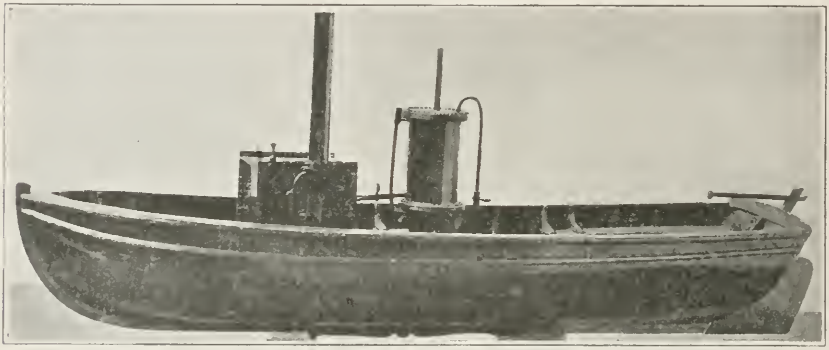


FIG. 5.—JAMES RUMSEY'S STEAMBOAT.

Model of John Fitch's steamboat.

An open carvel-built, sharp-ended keel boat, with raking, curved stem and sternpost; rudder hung outside and worked with tiller; round bilge; fitted with device invented by Fitch to operate 12 oars placed vertically; the machinery being driven by a steam engine, to which it was connected by gears and sprocket wheel and chain.

Dimensions of boat.—Length over all, 34 feet; beam, 8 feet; depth, 3 feet 6 inches; oars, each 12 feet long; scale of model, one-half inch equals 1 foot.

Experiments were made by Fitch with a stern paddle wheel and endless chain and side wheels, but meeting with little success he finally adopted the plan of propelling a boat by oars or paddles on the sides, to be moved by cranks driven by machinery. A public trial of this device was made on the Delaware River on July 27, 1786. In 1788 Fitch completed his first boat for carrying passengers, and this was driven in a similar manner. This steamboat was 60 feet long and 8 feet wide. The engine had a 12-inch cylinder. She made a trip from Philadelphia to Burlington, about 20 miles, in

July, 1788, which was the longest trip that had been made by any steamboat up to that date. On October 12, 1788, she took 30 passengers from Philadelphia to Burlington in 3 hours and 10 minutes, attaining a speed of over 6 miles an hour. In 1790 Fitch built another boat which attained a speed of 8 miles an hour. This steamboat ran on the Delaware River as a packet, carrying passengers and freight for three or four months. In its issue of Monday, July 26, 1790, the Federal Gazette and Philadelphia Daily Advertiser contained the following notice: "*The Steamboat* sets out tomorrow at 10 o'clock from Arch Street Ferry, in order to take passengers from Burlington, Bristol, Bordentown, and Trenton, and return next day.—Philadelphia, July 26, 1790." The fact that she was known as *The Steamboat*, would indicate that there were at that time no other steamboats in existence. On the trial trip referred to, Congress, then in session in Philadelphia, adjourned to witness the experiment.

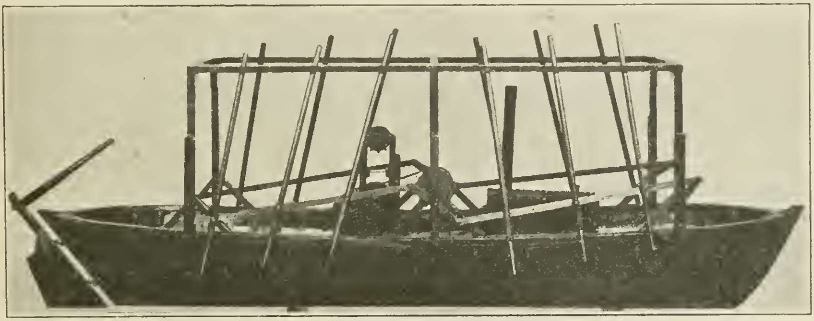


FIG. 6.—JOHN FITCH'S STEAMBOAT.

Made in the Museum. Cat. No. 203,712 U.S.N.M.

Model of John Stevens' twin-screw steamboat.

The first screw-propeller steamboat to navigate the waters of any country was built and engined by Col. John Stevens, in 1804, at Hoboken, N. J., and tested in the waters of New York Harbor.

An open wooden-keel boat of the ordinary ship's jolly-boat type; full convex bow; stem curved, raking very strongly below water line; round floor continued aft, the bottom rising in after section, and the run formed by a skag; square, nearly vertical, nonoverhanging stern; iron rudder outside; rather straight on top; fitted inside with three thwarts and the usual stern seats of the old-style jolly-boat; boiler, engines, screw propellers, etc., located and arranged as in the original steamboat.

Dimensions of boat.—Length over all, 24 feet 8 inches; beam, 6 feet 1 inch; width of stern, 4 feet 11 inches; depth, 2 feet 4⅝ inches; scale of model, 2 inches equal 1 foot.

The hull is built as nearly like the original as present data give information. The original boat was navigated in the harbor of New York in 1804, and had an average velocity of 4 miles an hour, and for a short distance at the rate of 7 to 8 miles an hour.

Made in the Museum. Cat. No. 160,306 U.S.N.M.

Original twin-screw propeller steam engine and boiler designed and built by Col. John Stevens.

A high-pressure, single-cylinder noncondensing engine, cylinder 4½ inches in diameter with a 9-inch stroke.

Colonel Stevens' plan for working twin screws by a single cylinder is the most simple one that could be devised. The reaction of the connecting rods against each other at their junction with the piston rod develops a parallel motion, as slides would do, to keep the rod in alignment. (When the screw propeller came into use, after a lapse of nearly 40 years, this plan of a single cylinder for twin screws was revived in this country and abroad, being known in France as the "Etoile engine.") The valves on the engine are formed by two-way cocks, a modification of the single-way cocks used by Savery and Newcomen, one cock at each end of the cylinder answering both for the admission and the exhaust of steam. The valve motion is derived from a crank on the inboard end of one of the propeller shafts. This crank works a rack, the teeth of which mesh into those of wheels on the plugs of the two-way cocks, the motion being similar to the toothed rack and segment of a wheel which Watt used in one of his first engines to raise his conical valves.

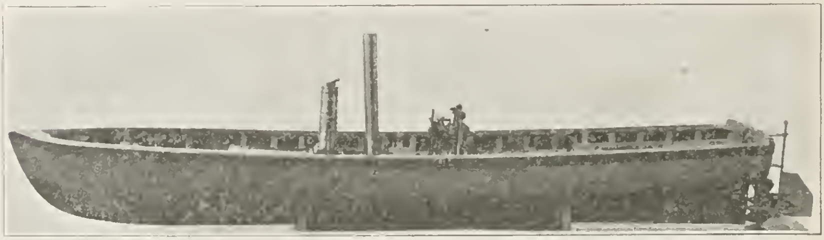


FIG. 7.—JOHN STEVENS' TWIN-SCREW STEAMBOAT.

The boiler is one form of the multitubular boilers patented by Stevens. It has 28 copper tubes, each 1½ inches in diameter and 18 inches long, 14 tubes projecting from each side of a rectangular chest. The grate is placed at the end of one set of tubes, and the flame passes around these tubes and then under the chest and around the tubes at the other end to the smokestack.

The following extract in relation to this twin-screw vessel is from a paper by Dr. James Renwick, written in 1858, addressed to Frederick De Peyster, of New York, and read by the latter at a meeting of the New York Historical Society, and then published in August of the same year in the "Historical Magazine" No. 8, of volume 2. Doctor Renwick was professor of Natural and Experimental Philosophy in Columbia College, New York, for many years; and was the author of several treatises on the steam engine, among which was a much quoted article, On the Steamboats of the United States of America, contributed to Tregold's Treaties on the Steam Engine, published in London, 1838:

"The first time that I ever heard of an attempt to use steam for propelling vessels was from a classmate of mine who resided during the summer months at Belleville, in New Jersey. He had in the summer of 1803 seen an experiment on the Passaic River which he stated to have been directed by John Stevens, of Hoboken. According to his account the propulsion was attempted by forcing water by steam of a pump from an aperture in the stern of the vessel.

"From some vague indications it would appear that the elder Brunel, afterwards so distinguished in Europe, was in the employment of Mr. Stevens on this occasion. In the month of May, 1804, in company with the same young gentleman and another classmate, now the distinguished missionary, John H. Hill, of Athens, Greece, I went to walk in the Battery. As we entered the gate from Broadway we saw what we in those days considered a crowd running toward the river. On inquiring the cause, we were informed that Jack Stevens[8] was going over to Hoboken in a queer sort of a boat. On reaching the bulkhead by which the Battery was then bounded we saw lying against it a vessel about the size of a Whitehall rowboat, in which was a small engine, but there was no visible means of propulsion. The vessel was speedily under way, my late much-valued friend, Commodore Stevens, acting as cockswain; and I presume the smutty-looking personage who fulfilled the duties of engineer, fireman, and crew was his more practical brother, Robert L. Stevens.

"A few years since at the last fair of the American Institute held at Niblo's I was asked to serve on a committee to report upon a boat and engine, exhibited by the Messrs. Stevens, for the purpose of sustaining the claim of their father to the honor of being the first inventor of the propeller. The circumstances I have just recounted had taken so strong a hold on my memory that I at once recognized the engine exhibited as that which I had seen at the Battery nearly 50 years before.

"In respect to the propeller, I could say nothing. One of my colleagues on the committee, however, Mr. Curtis, at that time United States inspector of steamboats for the port of New York, recognized as distinctly as I had done the engine and the propeller, which he had seen in the hands of the workmen by whom it was manufactured. The dates corresponded, and the apparatus was avowedly the making of Stevens of Hoboken. Thus it happened that an accidental choice had placed upon the committee two persons who were, by the union of their testimony, capable of establishing the fact into the truth of which they were directed to inquire."

---

[8] John Cox Stevens.

In the year 1844, by the direction of the sons of Colonel Stevens, this twin-screw engine and its boiler were overhauled by Mr. Isaac Dripps, then general superintendent of machinery on the Camden & Amboy Railroad, and afterwards in the same position on the Pennsylvania Railroad. The directions to Mr. Dripps were to make no alterations or additions except in minor parts where worn. The defects of the soldered pipes and joints were then remedied. The parts added in 1844 are shown on the machinery, colored yellow.

As the original boat had decayed in 1844, a new one was then built to receive the engine; and the boat with the engine then in it was exhibited at the fair held at Niblo's Garden, Broadway and Prince Street, New York, in October, 1844, and tried on the Hudson River, where it attained a velocity of 8 miles an hour.

The twin-screw engine and its boiler are now in exactly the same condition as when exhibited in 1844. They were preserved in the Stevens Institute at Hoboken, N. J., until sent to the World's Columbian Exposition, after which they were transferred to the Smithsonian Institution at Washington.

Deposited by Edwin A. Stevens. Cat. No. 181,179 U.S.N.M.

THE STEVENS MULTITUBULAR BOILER.

John Stevens patented his multitubular boiler in this country on August 26, 1791, and August 11, 1803, and in England on May 31, 1805. In addition to the boiler exhibited, two more are described, one having 81 tubes each 1 inch in diameter and the other having about 765 horizontal tubes each 1 inch in diameter and 2 feet long, placed between two tube sheets of cast brass, each sheet being 4 by 6 feet, the tubes being spaced 2 inches from center to center. The tube surface was 400 square feet. Another form of this boiler, with vertical iron tubes, that operated an experimental locomotive at Hoboken in 1825, is still preserved in the National Museum.

The English patent of 1805 was taken out by John Cox Stevens, then a very young man, who described the subject of the patent, the multitubular boiler, as "an invention communicated to him by his father." It was he whom Doctor Renwick recognized as coxswain of the "queer sort of a boat" at the Battery in May, 1804. In later years he was the founder and first commodore of the New York Yacht Club, and commanded the yacht *America* in her famous race off the

Isle of Wight in 1851. When in England in 1805 he went to Heathfield, the seat of Watt, who had then retired from business, and presented a letter from his father. Watt received him kindly, but reiterated his well-known objections to the use of steam at a pressure over two or three pounds above the atmosphere. These boilers of Colonel Stevens have often been referred to in relation to the introduction of the multitubular boiler on locomotives.

At the date of the introduction into use of the screw propeller, the pressure of steam carried on the boilers of condensing engines of the vessels that now navigate the bays and rivers of the Atlantic seaboard averaged about 10 pounds to the square inch, while on the innumerable steamboats on the Mississippi and its tributaries the steam averaged 140 pounds to the square inch. At the same date, the pressure on English vessels was the same that Watt had established—namely, 2½ to 3 pounds. The *Great Western*, in 1828, carried that pressure, and the iron screw propeller *Great Britain*, in 1840, carried only 5 pounds to the square inch.

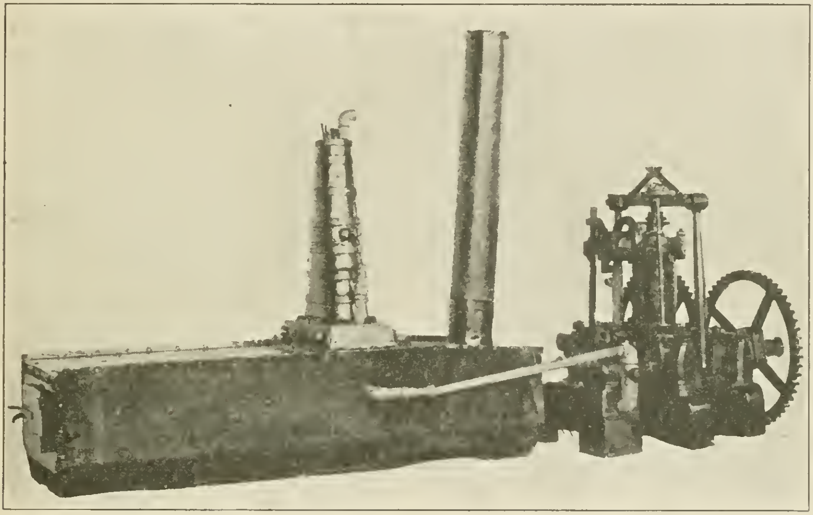


FIG. 8.—JOHN STEVENS' STEAMBOAT BOILER AND ENGINE.

Colonel Stevens attempted to introduce steam navigation by the screw propeller, laboring at the project for six years, and relinquishing it only one year before the successful application of the paddle wheel by Fulton.[9] The five distinct means he proposed were:

First. The short, four-bladed screw propeller.

Second. The use of steam of high pressure.

Third. The multitubular boiler.

---

[9] The original drawing of the machinery of the *Clermont* made by the hand of Fulton forms a part of the exhibition series in the section of naval architecture in the United States National Museum.

Fourth. The quick-moving engine connected directly to the propeller shaft.

Fifth. Twin screws.

None of these means were applied to steamboats for 30 years thereafter, and yet all are elements in the success of ocean navigation at the present day.

Steam-engine building as a trade did not exist in the United States until the year 1800, although it had long been established in England. Farey, in his Treatise on the Steam Engine, London, 1827, writes that in the 62 years intervening between Newcomen's first engine, in 1712, and Watt's first engine, in 1774, the steam engine had been extensively introduced throughout England in the form of pumping engines for draining mines and for raising water to turn overshot wheels, by which cotton mills and a great variety of machinery were driven, and that as early as 1750 steam-engine building had become a recognized trade in England.

The exportation from England of all machinery was prohibited by law except upon an order from the King in Council until 1820, when the law was repealed. Three known instances when this order was obtained were for the pumping engine at Chantilly for supplying the city of Paris with water, for the pumping engine of the Manhattan Co. for supplying the city of New York in 1799, and for Fulton's engine in 1806. All three engines were made by Watt.

Toward the close of the eighteenth century Hornblower, a distinguished English engineer, came to this country and erected a pumping engine[10] at the mouth of the shaft of a copper mine near Belleville, on the left side of the Passaic River, N. J., about 8 miles from New York, and established a small machine shop near by. This was then the only machine shop in the country. The second was erected in 1801 by McQueen in Duane Street, New York, near the Manhattan pumping engine.

The efficiency of the tools for engine building in this country in the year 1800 can be judged by the following extracts from a letter written by P. T. Cope to the city authorities at Philadelphia, in relation to the boring of a cylinder 38½ inches diameter by 6 feet stroke, for the pumping engine that was erected in the square at Broad and Market Streets, now the site of the Municipal Building. This letter, dated July 3, 1800, from Belleville, was published in 1876.[11] He writes that the boring of the cylinder was commenced on the 9th of the previous April; that the boring had been in progress from that date to the date of the letter, July 3, two men working day and night, relieving each other, "one almost living in the cylinder"; and that he expected "that about six weeks would be required to finish it."

---

[10] The cylinder of this, the first steam engine erected on the Western Continent, is a conspicuous object upon the floor of the National Museum in the Division of Mechanical Technology.

[11] Scientific American Supplement No. 45, Nov. 4, 1876, p. 706.

An inspection of the rude workmanship of the twin-screw engine, as well as that of the boiler, will explain the reason for the abandonment by Colonel Stevens of his plan of screw propulsion. There were no tools or competent workmen in America at that date to properly construct the steam engines and the boilers that he planned between 1800 and 1806. Success was impossible.

When he finally realized this, unwearied by his attempts to introduce steam navigation, dating from the year 1791, he reverted to the paddle wheel with its slow-moving engine, and with the boilers then in use, carrying steam at the pressure of 2 or 3 pounds above the atmosphere. He was engaged in building the *Phoenix* when Fulton arrived from Europe with the engine made for him by Watt in 1806, which, complete in all its details, and in these respects far in advance of any engine that could then have been built in this country, achieved success. Fulton's engine was the first steam engine that was allowed to be exported from England.

The paddle steamboat *Phoenix* was completed a few weeks after Fulton's vessel; and, as she was debarred from navigating the waters of the Hudson by the monopoly given to Fulton by the legislature of the State of New York, she was sent by sea to Philadelphia. The *Phoenix* was the first steamboat that navigated the ocean.

Colonel Stevens always maintained that with proper machinery, the screw would be found superior to the paddle for seagoing vessels. In 1816 he presented a plan to our Government for a man-of-war propelled by a screw. This may still remain in the archives of the Government at Washington.

In regard to the claim in behalf of Fulton, for the introduction of steam navigation, no one had admitted the justice of that claim more unqualifiedly than his unsuccessful rival. Fulton's fame rests not merely upon the success of the *Clermont* in 1807, but upon what he accomplished in the interval between that date and that of his death in 1814. Colonel Stevens in the letter to the Medical and Philosophical Society says:

"It is an unquestionable fact that he [Fulton] was the person who for any practical useful purpose, applied water wheels on each side of a steamboat." And again, "Fulton has, however, incontestably the merit of being the first person who applied steamboats to useful purposes."

Full-size copy of iron screw propeller used by Col. John Stevens in 1804.

In a letter written by Stevens to Dr. Robert Hare of Philadelphia, Pa., dated November 16, 1805, the following data appear:

"To the extremity of an axis passing nearly in a horizontal direction through the stern of the boat, is fixed a number of arms with wings like those of a windmill or smokejack. These arms are made capable of ready adjustment so that the most advantageous obliquity of their angle may be attained after a few trials. The principle of an oblique stroke is the same here as in the scull; but the continuity of movement in the wings gives them greatly the advantage over the alternation in the sculls, both in the loss of time and the resistance of the fluid in the change of motion. Besides that, this change of motion must give to the boat a wriggling movement and it has also a tendency to elevate and depress the stern of the boat. The sculls would also be liable to be affected by the swells in rough water and, like the paddles I had some thought of using, would be an awkward appendage to the stern of the boat. The consideration which determined me, when I saw you last, to make a trial of the paddles, was merely to avoid the necessity of giving the boat a draught of water too great for passing the overslough near Albany, but this objection to the use of wheels I expect to obviate by an increase of the number of them, and consequently a diminution of their diameter. Indeed, it is absolutely necessary to have at least two, revolving in opposite directions, to prevent the tendency to rotation which a single wheel gives to the boat. Since you were here, I have made a fair experiment on the wheel, compared with oars. Two men were placed at two cranks by which a wheel in the stern of the boat was turned, and with a stop watch the time of passing over a given distance was precisely ascertained. After making a sufficient number of trials, the wheel was taken off and the same men were furnished with oars. The result of repeated trials was a few seconds in favor of the wheel. It is unnecessary to observe that the wheel must have worked to much advantage. The proper angle of obliquity was not attended to; besides, the wings were made with a flat surface, whereas, a certain degree of curvature was necessary. And in order to give a due submersion to the wheel, the axis was inclined at least 30 or 40 degrees below the horizon line. The machinery, too, was put up in a very coarse manner."

This propeller blade is made in accordance with the description given in the letter to Doctor Hare. The broken shank on the hub shows the propeller to have been when last used the short two-bladed screw propeller of the present day, with the blades separately attached, and the two other opposite holes in the hub show that it was made to be also used as a four-bladed propeller. The blades are shown attached to the hub by a round bar or shank fitting into a corresponding hole in the hub and with its axis perpendicular to that of the propeller shaft so that the pitch can be adjusted by slightly turning the bar or shank in the hub.

Purchased. Cat. No. 180,597 U.S.N.M.

INTRODUCTION OF THE SCREW PROPELLER.

Water wheels for mills, driven by the action of a current against their vanes or blades, placed obliquely to the direction of the current, have been used in China for centuries and in Spain from the time of its conquest by the Moors. Prior to the revolution they were in use in this country for mills, and were called Chinese sculls or tub wheels. In principle this wheel is identical with the windmill, and when attached to a vessel and driven by power applied to a shaft it is a screw propeller.

Colonel Stevens, in his letter to Doctor Hare, quoted earlier, considered himself its inventor for the propulsion of vessels, but he was mistaken. It was proposed by the mathematician, Daniel Bernouli, in 1752, and it is described by David Bushnell in a letter to Thomas Jefferson, dated 1787, giving an account of his submarine boat to which a screw propeller, worked by hand, was applied, and of his attempt, with this boat, to blow up a 50-gun British ship in the harbor of New York.

The same idea of the propulsion of vessels by means of spiral wheels was afterwards suggested by Franklin, Watt, Paucton, and others.

Previous to the year 1802 the screw propeller was twice distinctly patented in England, and the invention was described in each patent by a specification and drawing. The patent to William Lyttleton was granted in 1794.

This screw propeller was a long spiral wheel, revolved by an endless rope on a pulley worked by manual labor. It was tried on a vessel at the Greenwich Dock, London, and a speed of 2 miles an hour was said to have been attained. The second patent was granted to Edward Shorter in 1800. Shorter had two plans, one a form of duck-foot paddles with an alternate movement, often proposed and tried before and since; the other a two-bladed screw propeller attached to an inclined shaft carried by a universal joint to the deck of the vessel. By one of Shorter's plans, but by which one is uncertain, the transport *Dencaster* was said to have been propelled at a speed of 1½ miles an hour by eight men working at a capstan.

The *first application of steam* to a screw propeller was made by Colonel Stevens on the Hudson River in the year 1802. His experiments in screw propulsion began in 1801 and were continued until some time in the year 1806. The engines that he tried in 1802, 1803, and 1804 were all noncondensing, and the boilers were all multitubular, in which steam of a high pressure was maintained.

The introduction of the screw propeller to general use was made simultaneously by Smith in England and by Ericsson in the United States. Both were men of great ability. Each considered himself the inventor of the screw propeller. Each took out patents in England in 1836 and in the United States two or three years afterwards. Each patent differed radically from the other. Neither patent, for the general application of the screw propeller, was sustained either here or abroad, and neither Smith nor Ericsson patented additional improvements on the screw propeller.

Each built small screw vessels in England that were successfully tried in 1837, Smith's being of 6 tons burden with a wooden screw, driven by a 6-horsepower engine; and Ericsson's, named the *Francis B. Ogden*, with sheet-iron screw having about double the tonnage and power.

Each built larger screw vessels that were successfully tried in England in 1839. Smith's vessel, the *Archimedes*, being upward of 200 tons burden and driven by engines designed by Rennie, of 90 horsepower. It circumnavigated the island of Great Britain in May, 1840. Ericsson's vessel, the *Robert F: Stockton*, smaller and with less power, was tried in England under steam and then, in April, 1839, crossed the Atlantic under sail.

Each introduced the screw propeller on merchant vessels in 1840.

Each introduced the screw propeller on war vessels in 1843—Ericsson on the *Princeton* and Smith on the *Rattler*.

Both were materially assisted in the introduction of the screw propeller into use by the improvements of those who built screw-propeller vessels independently of the patents of the other.

The plan of Ericsson's screw propeller on the *Robert F. Stockton* was in exact accordance with his patent. Smith's plan on the *Archimedes* varied considerably from his patent.

Both finally modified their screw propellers, as patented, into the short screw propellers now in common use.

Model of Robert Fulton's steamboat "Clermont."

The first steamboat commercially successful was built in the city of New York by Robert Fulton and made its first trip from New York to Albany in August, 1807.

A carvel-built, flat-bottom, scowlike vessel, with sharp vertical ends and perpendicular sides; straight on top; open in middle; fitted with Boulton & Watt engine.

Dimensions of vessel.—Length, 175 feet; beam, 12 feet; depth, 8 feet. Scale of model, one-half inch equals 1 foot.

Originally the *Clermont* was 175 feet long and only 12 feet wide, her hull being built after Beaufoy's model of least resistance. She was equipped with a single-acting bell-crank engine, cylinder 24 inches in diameter and 4-foot stroke. The engine was purchased from Boulton & Watt by Fulton in 1806, while the latter was in England.

The central portion of the boat was originally open, with no covering over the engines or paddle wheels; the latter were 15 feet in diameter. There was a small cabin at the bow. After running successfully to Albany for several trips the *Clermont* was entirely remodeled and rebuilt in the winter of 1807–8. Her bow was then made somewhat like that of a North River sloop. The hull was shortened to 130 feet and her beam was increased to 16 feet. She was then furnished with two masts, deck house, and cabins, as shown in the illustration usually contained in histories of the steamboat. She was also equipped with new boilers of increased capacity. The new *Clermont* ran successfully for several years.

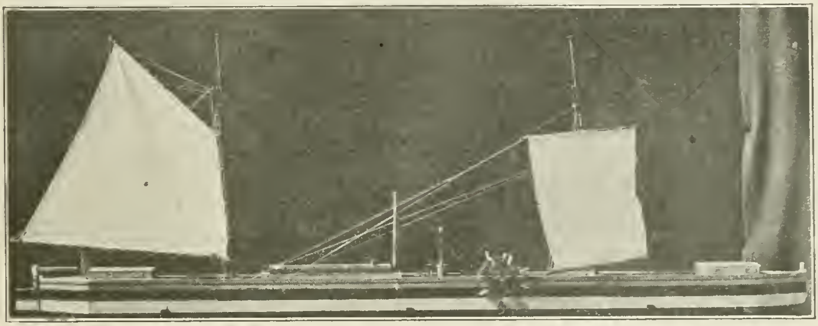


FIG. 9.—ROBERT FULTON'S STEAMBOAT "CLERMONT."

"She was a common open-river boat * * * with no deck, and the boys were running about everywhere. The only cabin was a small room at the bows." (Extract from letter of William Perry.)

Made in the Museum. Cat. No. 160,302 U.S.N.M.

Model of John Stevens' steamboat "Phoenix."

A wooden, carvel-built, paddle-wheel steamer; moderately sharp flaring bow, with slightly concave lines below and strongly convex lines above; raking, curved stem; shallow keel; long, flat floor; short turn to bilge; wall side; short, flat, scowlike, run, with skag; straight, vertical sternpost; heavy, square stern, with little rake; flush deck; afterpart covered with awnings. Rigged with two masts, with square sail on foremast and boom and gaff mainsail. Equipped with steam engine and paddle wheels.

Dimensions of vessel.—Length over all, 103 feet 3 inches; on deck, 101 feet; beam, 16 feet; depth, 6 feet 9 inches; foremast above deck, 57 feet; foreyard, 35 feet; mainmast above deck, 50 feet 2 inches; mainboom, 40 feet; maingaff, 21 feet. Scale of model, one-half inch equals 1 foot.

The hull and engine of the *Phoenix* were built under the personal direction of Col. John Stevens. Originally the vessel was equipped with a crosshead engine, with twin condensing cylinders, 16 inches diameter and 3-foot stroke. The boiler, set in brickwork, consisted of a cylindrical shell with one return flue. After making the trip from Sandy Hook to Philadelphia the double cylinders were replaced by a single cylinder of 24 inches diameter, a flywheel being used to actuate the shaft "over the center."

The *Phoenix* made her trip from Sandy Hook to Cape May, the first sea voyage ever made by a steam vessel, in the summer of 1808. On her passage she encountered a storm, which damaged her somewhat and compelled her to seek shelter in Barnegat Bay. After reaching Philadelphia she ran for a number of years as a packet on the Delaware River. She was finally wrecked at Trenton, N. J., in 1814.

The experience obtained in constructing and operating this vessel formed the basis for the successful career of Robert L. Stevens as a marine engineer.

Made in the Museum. Cat. No. 160,303 U.S.N.M.

Model of steamboat.

The *Orleans* was the first steamboat to navigate the Ohio and Mississippi Rivers. She was constructed at Pittsburgh, Pa., 1810–11, by Nicholas Roosevelt, from plans and capital furnished by Robert Fulton.

She was a wooden, carvel-built, stern paddle-wheel steamboat, with blunt bow, scowlike run, and light draft.

Dimensions of boat.—Length, 116 feet; beam, 20 feet; depth, 7 feet. Scale of model, about one-sixteenth inch equals 1 foot.

The engine had a single horizontal cylinder 34 inches diameter, constructed by Fulton at his shops in Jersey City, N. J., which actuated a single paddle wheel attached to the stern of the boat.

Nicholas Roosevelt, accompanied by his bride, made the first journey from Pittsburgh to New Orleans in a steamboat in this vessel in the summer of 1811.

The *Orleans* plied between New Orleans and Natchez for several years.

The introduction of steam upon the western waters changed the relations of the West to the East, and was the most important step in the development of the Western and Southern States.

Made in the Museum. Cat. No. 160,401 U.S.N.M.

Model of steamship "Savannah."

This ship was built by Francis Fickett at Corlears Hook, N. Y., and was launched August 22, 1818. Originally designed as a sailing ship to run as a packet to Havre, France, she was purchased before completion and fitted with steam engine and adjustable paddle wheels. Her engine was made by Stephen Vail at Speedwell Iron Works, near Morristown, N. J. Capacity: 75 tons of coal, 25 cords of wood. Master, Moses Rogers; navigated by Stevens Rogers; both of New London, Conn.

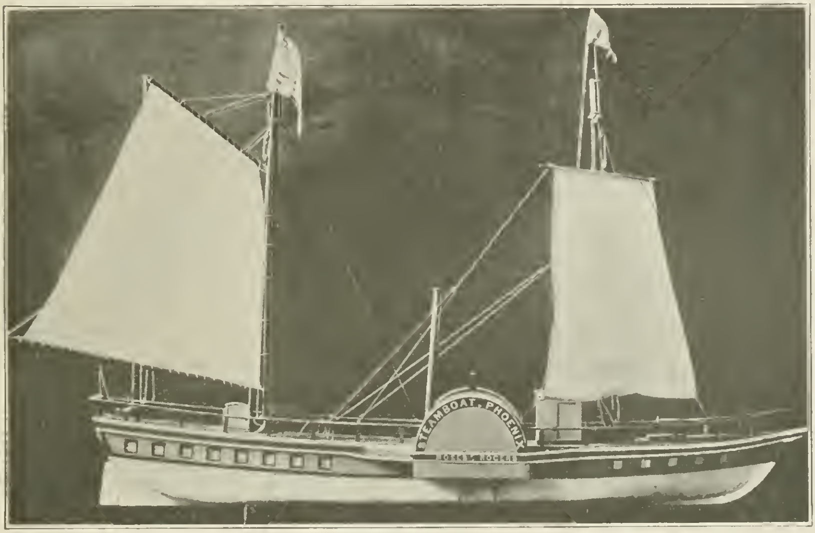


FIG. 10.—JOHN STEVENS' STEAMBOAT "PHOENIX."

A wooden, carvel-built keel ship; bow strongly convex and full above water, finer below; raking curved stem; large full head; moderately rising round floor; easy bilge; rather long, well-shaped run: straight, nearly vertical, sternpost; narrow, square-heeled rudder; round stern; medium sheer; fitted with deck houses, wheelhouse, and cabin poop flush with main rail and extending from side to side. Carries a full ship rig, not including anything higher than topgallant sails. Equipped with paddle wheels attached to jointed shaft, so that they can be turned inboard.

Dimensions of vessel.—Length over all, 120 feet; on load water line (including stem and sternpost), 116 feet; beam, extreme, 29 feet: depth of hold, 13 feet 6 inches: tonnage, 350 tons, old measurement: bowsprit. outboard, 23 feet 6 inches; jibboom, outside cap, 23 feet, foremast, above deck, 43 feet: fore topmast, heel to head, 34 feet: fore topgallant mast, heel to truck, 29 feet; foreyard, 55 feet; fore topsail yard, 46 feet 6 inches; fore topgallant yard, 34 feet 6 inches; mainmast, above deck, 47 feet: main topmast, 34 feet 6 inches: main topgallant mast, 31 feet; main yard, 60 feet; main topsail yard, 46 feet 6 inches; main topgallant yard, 34 feet 6 inches; mizzenmast, above deck, 33 feet 6 inches; mizzen topmast, 27 feet; mizzen topgallant mast, 25 feet; crossjack yard, 41 feet; mizzen topsail yard, 34 feet: mizzen topgallant yard, 24 feet: spanker boom, 28 feet; gaff, 21 feet.

The *Savannah* cost about $50,000 when ready for sea. She was equipped with one inclined, direct-acting, low-pressure engine of 90 horsepower, the diameter of the cylinder being 40 inches and the stroke 5 feet. The boilers were built by Daniel Dod at Elizabeth, N. J.

"The side paddle-wheels consisted of eight radial arms, held in place by one flange, and were arranged to close together like a fan. They were furnished with a series of joints, so that they could be detached from the shaft and taken in on deck when storm or other circumstances required it. Her shaft had a peculiar joint at each end, arranged for the purpose. The wheelhouse was made of canvas, stretched over an iron rim."

The ship sailed from Savannah, Ga., May 22, 1819, and arrived in Liverpool, June 20. Nearing the British coast, she was mistaken for a ship on fire. The London Times of June 30, 1819, alluding to this event, says:

"The *Savannah*, a steam vessel, recently arrived at Liverpool from America, the first vessel of the kind which ever crossed the Atlantic, was chased the whole day off the coast of Ireland by the *Kite*, revenue cruiser on the Cork station, which mistook her for a ship on fire."

Subsequently she visited Elsinor, Stockholm, and St. Petersburg, returning to Savannah from the latter city. After her return, she was divested of her engine and for several years ran as a sailing packet between New York and Savannah. In 1822 she ran ashore on Long Island and went to pieces.

Made in the Museum. Cat. No. 160,364 U.S.N.M.

Model of steamship.

The screw steamship *Cuba*, was built at Philadelphia, Pa., by Neafie & Levy, in 1875. The steamship *Oriental*, a sister ship, was built in the same year.

A single-screw, brig-rigged steamship; long, sharp bow, with concave water lines; stem straight and vertical above water, curved below; low floor; easy bilge; long, finely-formed run; overhanging round stern; moderate sheer; whalebacked forward and aft; deck houses, pilot house, bridge, etc., between masts; six boats on davits; open rails.

Dimensions of vessel.—Length over all, 246 feet 9 inches; beam, 28 feet 4 inches; depth, 17 feet 3 inches; foremast, above deck, 51 feet; foretopmast, heel to truck, 36 feet; foreyard, 49 feet, 4 inches; foretopgallant yard, 38 feet 3 inches; mainmast, above deck, 53 feet 3 inches; maintopmast, 36 feet 9 inches; maingaff, 34 feet 4 inches; boats, 19 feet, 4 inches long, 3 feet, 9 inches wide. Scale of model one-fourth inch equals 1 foot.

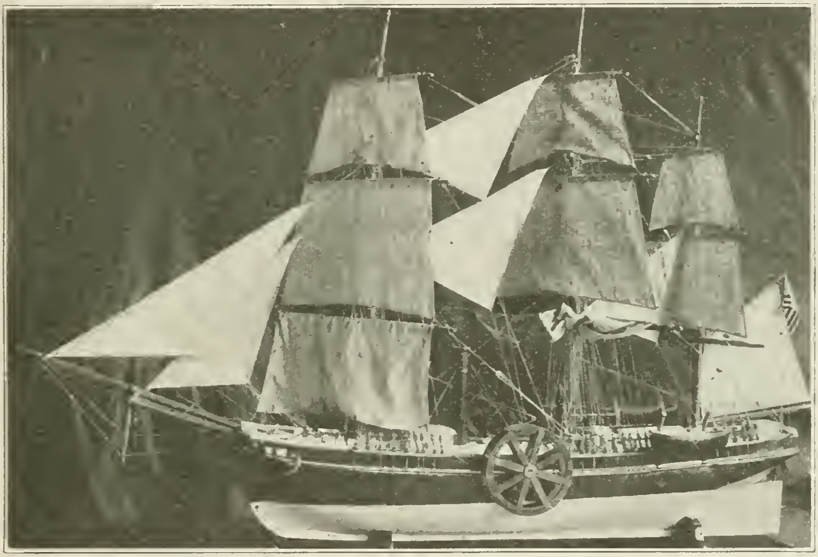


FIG. 11.—STEAMSHIP "SAVANNAH."

Gift of Neafie & Levy. Cat. No. 160,201 U.S.N.M.

Model of steamboat "Robert F. Stockton."

This was the first steam vessel with iron hull or screw propeller to cross the Atlantic. She was built at the Birkenhead Iron Works, England, in 1838, and fitted with Ericsson's screw propeller. She was one of the first screw steamers ever constructed. Before sailing she was rigged as a schooner; her propeller was unshipped and the voyage across the Atlantic was made under canvas from Liverpool to New York. She was employed for many years as a tugboat.

Dimensions of vessel.—Length over all, 63 feet 5 inches; width, 10 feet; depth, 7 feet; tonnage, 33; horsepower, 30. Scale of model, one-tenth of an inch equals 1 foot.

The invention of the screw propeller by Ericsson attracted the attention of Lieutenant Stockton, of the United States Navy, and led to the building of this tugboat to be used for a canal with the construction of which he was connected. The intercourse which resulted between these men is thought to have induced Ericsson to come to America, which he soon did.

His influence on the development of American steam navigation, war vessels, etc., is well known.

The *Stockton* was built under the superintendence of F. B. Ogden, United States consul at Liverpool, for the Delaware & Raritan Canal Co., and her principal service for years was in towing canal boats, etc., between Philadelphia and the terminus of the canal. She was 40 days making the passage across the Atlantic, sailing from Liverpool April 11, 1839, and arriving at New York May 21. Her crew consisted of Captain Crane, four men, and a boy. By act of Congress, she was admitted to American registry May 8, 1840, under the name of *New Jersey*.

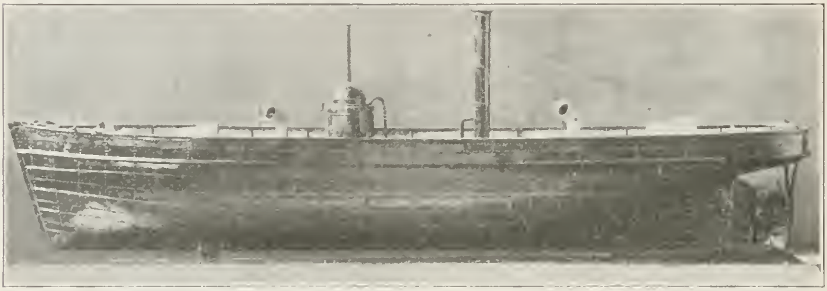


FIG. 12.—STEAMER "R. F. STOCKTON."

Made in the Museum. Cat. No. 160,404 U.S.N.M.

Model of Ohio River steamboat.

The paddle-wheel steamer *Grey Eagle* was built at Jeffersonville, Ind., and at one time was running as United States mail packet between Louisville and Henderson, Ky.

A wide, shallow, flat-bottom, carvel-built, keelless, side-wheel, high-pressure steamboat; moderately sharp convex bow; curved stem; flaring sides; sharp run; vertical sternpost; wide rudder; narrow, light stern; wide guards flush with main deck; paddle wheels about one-fourth boat's length from stern; two upper decks and "Texas" above main deck, with staterooms, saloons, etc.; pilot house about amidships on top of all; two smokestacks; flagpoles forward and aft and on each side by wheel box; derrick forward for hoisting cargo.

Dimensions of steamer.—Length, 208 feet; beam, 39 feet; extreme width over guards, 60 feet 6 inches; depth of hold, 8 feet 6 inches; extreme height, bottom of hold to top of pilot house, 54 feet. Scale of model, one-fourth inch equals 1 foot.

Made in the Museum. Cat. No. 160,323 U.S.N.M.

Model of steam tugboat.

An iron, single-screw, seagoing steam tug; long, sharp bow, slightly concave at water line; stem straight and nearly vertical above water, curved and raking below; shallow keel; sharp floor; long, finely-shaped run; overhanging round stern; graceful sheer; flush deck; heavy iron towing bollards forward and aft, also two on each rail; deck house about half the length of tug, covering engine, boilers, etc., and furnishing cabin accommodations for crew; pilot house above forward end of deck house; boats and skylight on after end.

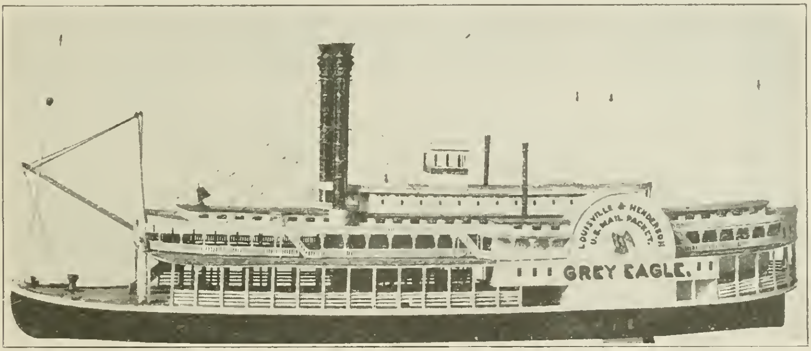


FIG. 13.—OHIO RIVER STEAMER "GREY EAGLE."

Dimensions of vessel.—Length between perpendiculars, 102 feet 6 inches; beam, 22 feet; depth, 11 feet; gross tonnage, 139.68; nominal horsepower, 350. Scale of model, nine-sixteenths inch equals 1 foot.

Gift of Neafie & Levy. Cat. No. 160,167 U.S.N.M.

Block model of steam packet.

The screw steam packet *Decatur*, of Newburyport, Mass., was built at that city about 1844 from this model. She was employed as a freight and passenger packet, plying between Newburyport and Boston. The model is historically interesting as representing one of the earliest types of American screw coasting steamers.

The *Decatur* was a wooden, carvel-built, single-screw propeller, with moderately sharp and flaring bow; long, flat floor; round, easy bilge; straight wall side; rather short run; round stern; lines generally convex and full; very straight on top.

Dimensions of vessel.—Length over all, 132 feet; beam, 21 feet 4 inches; depth, 8 feet 8 inches. Scale of model, three-eighths inch equals 1 foot.

Gift of Sumner, Swasey & Currier. Cat. No. 76,055 U.S.N.M.

Block model of paddle-wheel steamboat.

The side-wheel steamer *Ohio*, of Newburyport, Mass., was built from this model in 1846, to ply as a packet between Newburyport and Boston. Compared with side-wheel steamers of a later date, she had full lines forward and aft, and was rather narrow amidships. The midship cross section is nearly like that of a scow, with a dead-flat floor only slightly rounded at the turn of the bilge, a feature of side-wheel steamers that is still in favor.

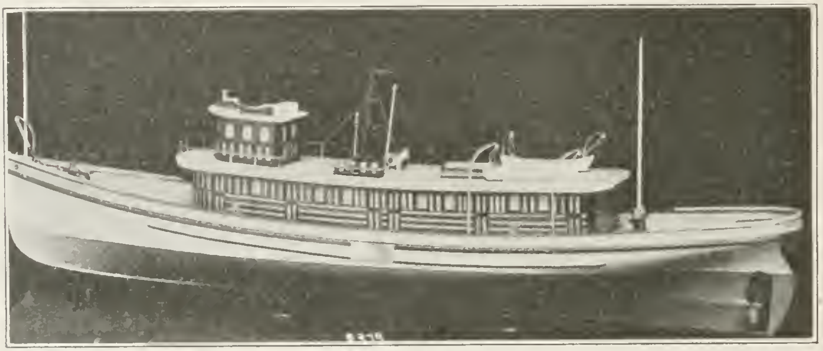


FIG. 14.—AMERICAN STEAM TUG "RATTLER."

A wooden, carvel-built, paddle-wheel steamer, with rather full convex bow, flat floor, short turn to bilge, long, narrow box-shaped midship section, short stern, and wide guard projecting beyond the hull at side and stem.

Dimensions of vessel.—Length over all, 133 feet 4 inches; extreme beam (on guard), 29 feet 8 inches; of hull, 19 feet 4 inches; depth of hull, 6 feet 8 inches; tonnage, 225 tons, old measurement. Scale of model, three-eighths inch equals 1 foot.

Gift of Sumner, Swasey & Currier. Cat. No. 76,056 U.S.N.M.

Block model of steamship.

The wooden ship-rigged steamship *Meteor* was built from this model at Portsmouth, N. H., and launched on May 21, 1864. She was built from subscriptions by merchants of Boston, New York, and elsewhere for the purpose of offering her to the United States Government for the pursuit of the *Alabama* and other Confederate cruisers, as well as blockade runners, which were then preying upon American commerce or carrying supplies to the Confederates.

The *Meteor* was a wooden, single-screw steam propeller, with a complete ship rig, her area of canvas being nearly as large as that of a sailing ship. The design of the hull has probably never been excelled for a steam vessel of her size. She had a long, sharp bow; stem straight and nearly vertical above water; curved below; low floor and rather full midship section; long, finely shaped run; overhanging round stern; moderate sheer.

Dimensions of vessel.—Length over all, 198 feet; beam, 48 feet; depth, 18 feet 6 inches; 1,440 tons, old measurement. Scale of model, one-half inch equals 1 foot.

Toward the close of the Civil War in the United States, when the Confederate cruisers were playing havoc with northern shipping, a subscription was made up by Atlantic coast merchants to build a fast cruiser with the intention of fitting her out and presenting her to the Government to join in the chase. The design for this ship was offered in competition, the competitors being Henry and William H. Webb, of New York, and D. J. Lawlor, of Chelsea, Mass. Lawlor's model was accepted.

She was about 400 tons larger than the *Alabama* and made the best time on her trial trip off Sandy Hook which had then ever been made by any screw ship, exceeding by 1 or 2 miles an hour the speed of any of the Confederate cruisers. But when the Government was about ready to take her the capture of Fort Fisher caused her to be no longer necessary for the purpose for which she was built. Consequently, after making two or three voyages in the merchant service, she was laid up for sale at New York during the summer of 1865. Soon after, war was declared by Spain against Chile and Peru. Some negotiations were had regarding her purchase by South American agents. "When ready for sea, with her crew and stores on board, the *Meteor* was seized, on the 23d of January, 1866, by the United States marshal, at the instance of Spain."[12] The proceedings against the ship lasted nearly three years, and she was actually detained, including the time needed for repairs, 7 months and 28 days. She took part, under another name, in the war between Chile and Peru.

"She was designed to carry one heavy pivot amidships on the gun deck, or two 10-inch or other guns at the same point, namely, just before the mainmast; forward of this are four ports (two on each side) where 8 or 9 inch Dahlgrens would have been mounted had she been taken by the United States Navy Department, and abreast of the engine hatch aft there are two ports on each side where she could have mounted short 32 or 24 pound howitzers, and on the upper deck are beds for two 30-pound Parrotts, making one pivot 11 inch, or two 10 inch; four broadside, 8 or 9 inch; four 32 or 24 pound howitzers on gun deck; two light chase guns on upper deck. She has two 62½ by 30 inch cylinders; four tubular boilers; propeller of brass, 13½ feet in diameter and 23-foot pitch. The motive power, boilers, etc., were imported from Scotland at a very large cost." (From letter of R. B. Forbes.)

---

[12] Report of the case of the steamship *Meteor*, vol. 1, p. xiii.

Gift of D. J. Lawlor. Cat. No. 76,045 U.S.N.M.

Block model of steam tugboat.

The steam screw tug *Atlantic*, of the United States Quartermaster's Department, was built from this model at Boston, Mass., in 1873, and was used about New York harbor by Gen. W. S. Hancock, United States Army. She was designed by D. J. Lawlor, Chelsea, Mass.

A wooden, carvel-built, single-screw steamer, with long, sharp bow; very hollow at and below water line; moderate rise to floor, which is slightly concave; rather deep, quick bilge; tumble-in top sides; lean run; long, overhanging round stern; very strong sheer. The water lines are on the "wave" principle, while the section lines have an easy curve from bow to end of counter.

Dimensions of vessel.—Length over all, 78 feet 3 inches; beam, 18 feet; depth, 9 feet; draft, loaded, 8 feet 9 inches. Scale of model, one-half inch equals 1 foot.

Gift of D. J. Lawlor. Cat. No. 76,043 U.S.N.M.

Block model of steam launch.

Long sharp bow; rising floor; fine easy run; good sheer.

Dimensions of launch.—Length over all, 36 feet; beam, 9 feet 6 inches; depth, molded, 5 feet, 1½ inches. Scale of model one-half inch equals 1 foot. Cat. No. 160,130 U.S.N.M.

Model of steamship.

The *Philadelphia* was built by James and George Thompson, Clydebank, Glasgow, Scotland, and entered service in 1889 under the British flag, under the name of *Paris*. She was purchased in 1892 by the International Mercantile Marine Co., transferred to the American flag and renamed the *Philadelphia*. During the Spanish-American War the *Paris*, renamed the *Yale*, was used by the United States Government as an auxiliary cruiser, at a cost of $2,000 a day. In 1916 the *Philadelphia* ran between New York and Liverpool.

This is a twin-screw, triple-blade steamer with sharp bow and little rake; square bilge amidship; round overhanging stern; propeller shafts stream-lined to act as fins; gradual run; stem vertical. She has a main deck and hurricane deck, the latter having two small deck houses amidship and forward. A pilot house and bridge are over the hurricane deck.

Dimensions of vessel.—Length over all, 576 feet; beam, 63 feet; tonnage, 10,786. Power, two triple expansion steam engines. Scale of model, one-fourth inch equals 1 foot.

Transferred from United States Post Office Department.

Cat. No. 271,111 U.S.N.M.

Model of steamship.

The steamship *Cambrai* is one of 12 fabricated steel army transports built by the American International Shipbuilding Corporation, Hog Island, Pa., for the United States Shipping Board, Emergency Fleet Corporation, of which 11 were delivered to the United States Army and 1 to the United States Navy. The keel of the *Cambrai* was laid November 9, 1918, and the ship placed in commission October 30, 1920.

This vessel has a sharp straight bow overhanging forward; square bilge; pointed stern, straight sheer; sloping stem; deck cut away fore and aft of amidship; deck house amidship; pilot house and bridge over deck house forward; two quadruple cranes forward, and one quadruple and one double crane aft; single-screw propeller.

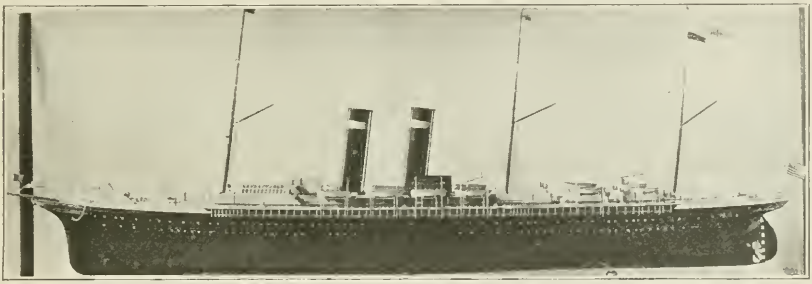


FIG. 15.—TWIN-SCREW STEAMSHIP "PHILADELPHIA."

Specifications of vessel.—Length over all, 450 feet; length, load water line 435 feet; molded beam, 58 feet; depth to upper deck, 40 feet; draft loaded, 28 feet; weight of steel hull, 3,400 tons; weight of machinery with water, 760 tons; weight of wood and outfitting, 300 tons; total weight of ship, 4,460 tons; total displacement, loaded, 12,460 tons; gross tonnage (estimated), 6,200 tons; boilers, 6; horsepower, 1,740; power, 1 steam turbine; shaft, horsepower, 6,000; fuel, oil; oil capacity, 1,600 tons; oil consumption in 24 hours, 70½ tons; cruising radius, 8,132 nautical miles; speed, 15 knots; scale of model, one-eighth inch equals 1 foot.

Transferred from United States Senate Committee on Commerce.

Cat. No. 306,999 U.S.N.M.

SAILING VESSELS.

Model of Spanish fifteenth century sailing vessel.

This model is representative of the type of vessel used by Christopher Columbus on his voyage to America.

The vessel was of about 100 tons burden and her dimensions were about 90 feet in length and 20 feet beam. She was decked over and had a high poop astern and a high forecastle bow. She had three masts, two of them square-rigged, with a lateen sail on the mizzenmast.

It is stated that Columbus had a crew of 52 persons on the *Santa Maria*, which was undoubtedly a far larger crew than really necessary, for a modern vessel comparable in size is manned by a crew of six or eight men.

Made in the Museum. Cat. No. 244,931 U.S.N.M.

Model of seventeenth century English sailing vessel.

The model represents a carvel-built keel ship having a full bluff bow, square at the top; large, full head; curved stem, raking strongly below; considerable rise to floor; short but moderately sharp run; straight, nearly vertical sternpost; narrow, square-heeled rudder; high, heavy square stern, much narrower above than below; tumble-in top side; high forecastle; quarter-deck rises in three sections, each of considerable height, the poop or highest part abaft mizzenmast. Ship-rigged, with square sails on bowsprit, fore and main masts, and settee sail (lateen sail with forward corner cut off) on mizzenmast; flags set on flagpoles above each topmast head; hemp sails. Jolly-boat stowed on main deck, over grating.

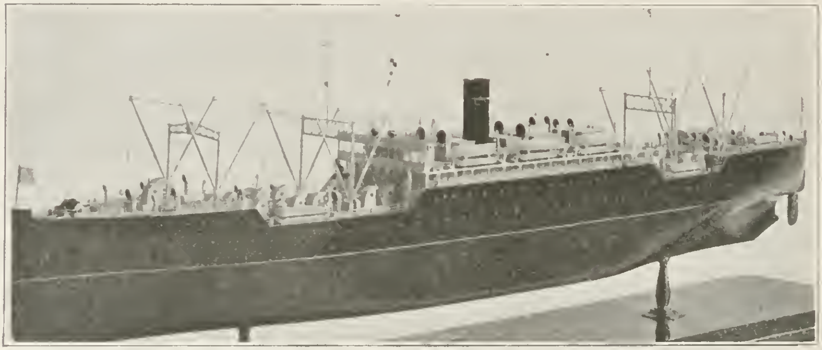


FIG. 16.—SINGLE-SCREW STEAMSHIP "CAMBRAI."

The model is representative of the type of vessel used to carry English colonists to America in the early part of the seventeenth century.

Dimensions of vessel.—Length over all (stem head to taffrail), 66 feet; beam, 18 feet; depth amidships, 10 feet; bowsprit, outboard, 26 feet; sprit topmast, 19 feet; spritsail yard, 29 feet; sprit topsail yard, 18 feet; foremast, above main deck, 43 feet; fore-topmast, heel to head, 31 feet; flagpole, above topmast, 7 feet; foreyard, 41 feet; fore-topsail yard, 35 feet; mainmast, above deck, 45 feet; main topmast, heel to head, 33 feet; flagpole, above topmast, 7 feet 6 inches; main yard, 44 feet; main topsail yard, 36 feet; mizzenmast, above quarter-deck, 32 feet; mizzen topmast, heel to head, 22 feet; flagpole, above topmast, 6 feet 6 inches; crossjack yard, 41 feet 2 inches. Jolly-boat, 16 feet long; 5 feet 6 inches wide; 15 inches deep. Scale of model, one-half inch equals 1 foot.

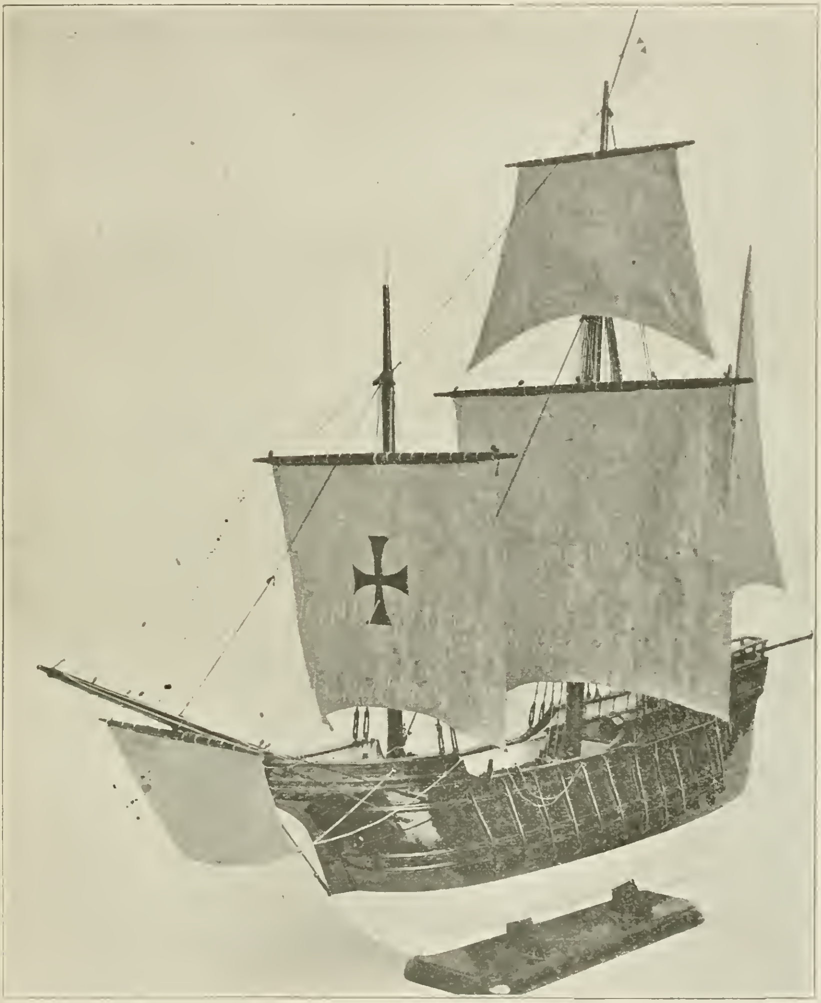


FIG. 17.—SPANISH FIFTEENTH CENTURY SAILING VESSEL.

Made in the Museum. Cat. No. 160,187 U.S.N.M.

Model of seventeenth century Dutch sailing vessel.

This model was constructed from an engraving in Monteith's Geography of 1872, and is supposed to be representative of the type of vessel used by Henry Hudson.

The model represents a vessel carrying square sails on the foremast and bowsprit and a lateen sail on the mainmast. The ends of the vessel are substantially alike; they are excessively full—almost square; the bottom is nearly flat and extends the entire length, there being no run and practically no upward slope to the bow. There is a deep waist on the main deck; a topgallant forecastle; a high quarter-deck; the quarter-deck bulwark extends abaft the deck, forming a sort of pink, through which the rudder head passes. The bowsprit is formed of timber joined at their outer ends and separated where they meet the stem, thus acting as a vertical support to each other.

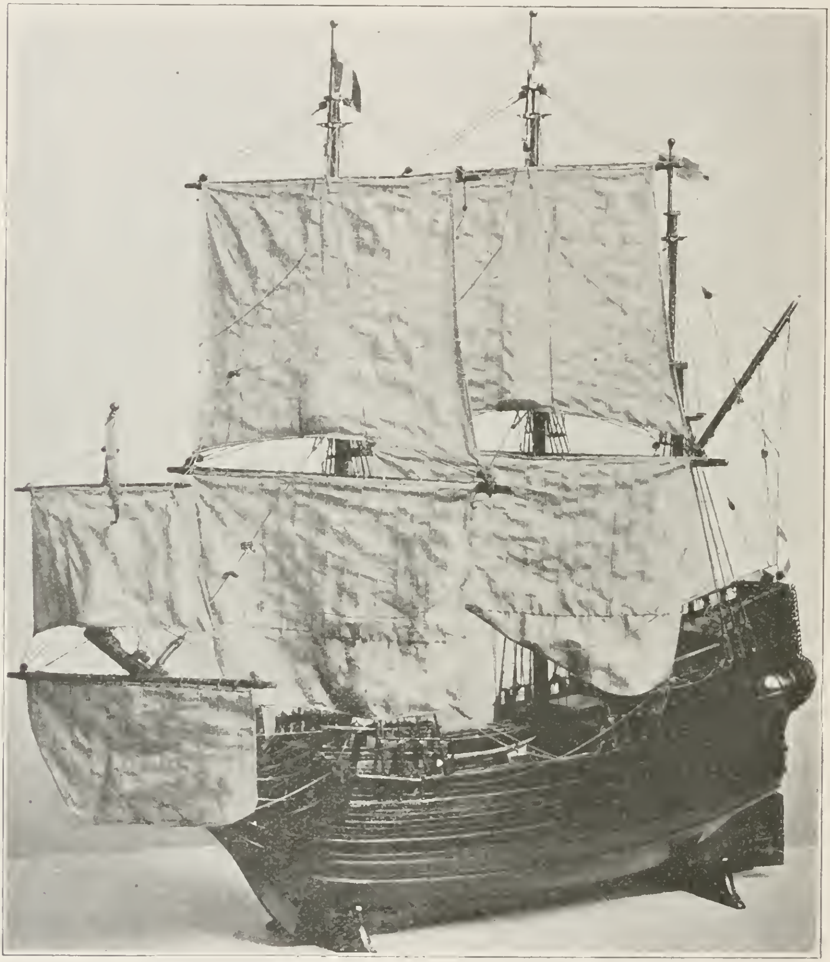


FIG. 18.—ENGLISH SEVENTEENTH CENTURY SAILING VESSEL.

Dimensions of vessel (estimated).—Length over all, 76 feet; beam, 17 feet; depth of hold, 6 feet; mainmast above deck, 30 feet; main topmast, 23 feet; foremast, above deck, 27 feet; fore-topmast and topgallant mast, combined, 30 feet; bowsprit, outside, 24 feet; spritsail topmast, 16 feet. Scale of model, one-fourth inch equals 1 foot. Made and presented by William J. Boyd. Cat. No. 76,161 U.S.N.M.

Model of merchant ship.

A wooden, carvel-built, keel ship, with moderately sharp bow, projecting strongly forward at top; raking curved stem; long head: rather sharp floor; wall side; short, well-shaped run; overhanging elliptical stern (with gilded cable around it and name "St. Matthew" and hail in center); fine sheer; poop deck flush with main rail extending nearly half way between mizzenmast and mainmast; cabin trunk and wheelhouse on poop; deck house for forecastle and galley abaft foremast; two boats on top of deck house; caplines dingey at davits on starboard side; full ship rigged, without sails; lower masts banded, etc., to show method of building masts.

Dimensions of ship.—Length over all, 224 feet; between perpendiculars, 204 feet; beam, 36 feet; depth, 26 feet; bowsprit, outboard, 26 feet: jibboom, cap to end, 40 feet; foremast, above deck, 69 feet: fore-topmast, heel to head, 58 feet; fore-topgallant royal and skysail masts, combined, heel to truck, 63 feet; foreyard, 92 feet; lower fore-topsail yard, 81 feet 6 inches; fore-topgallant yard, 62 feet; foreroyal yard, 47 feet; foreskysail yard, 35 feet; mainmast, above deck, 72 feet; main topmast, heel to head, 60 feet; main topgallant mast, etc., heel to truck, 64 feet; main yard, 95 feet; lower main topsail yard, 87 feet; upper main topgallant yard, 62 feet; main royal yard, 49 feet; main skysail yard, 36 feet; mizzenmast, above cabin trunk, 55 feet; mizzen topmast, heel to head, 50 feet; crossjack yard, 72 feet; mizzen topgallant yard, 45 feet; mizzen royal yard, 38 feet; mizzen skysail yard, 29 feet 6 inches; spanker boom, 54 feet; spanker gaff, 38 feet; gaff, 23 feet. Scale of model, one-eighth inch equals 1 foot.

The rig of this model gives an excellent idea of the lofty rig of American sailing ships, especially in the days of clipper sailing packets.

Gift of B. F. Keith. Cat. No. 76,150 U.S.N.M.

Block model of merchant ship.

The merchant ship *Atticus* was built from this model at Castine, Me., in 1818. This was a wooden, carvel-built, keel vessel, with full, round, nonflaring bow; stem nearly straight and vertical above load water line, raking and strongly curved below; moderately dead rise to floor; rather long well-shaped run; heavy square stern; good sheer; ship wider in proportion than ships of a later period.

Dimensions of vessel.—Length over all, 132 feet; beam, 33 feet 4 inches; depth of hold, 16 feet 8 inches; 298 tons, old measurement. Scale of model, three-eighths inch equals 1 foot.

This model has peculiar interest from the fact that it conveys a good idea of the form of New England-built merchant ships of the early part of the nineteenth century—almost immediately after the close of the War of 1812–15 with Great Britain. Although less than 300 tons, old measurement (equal to about 220 tons new measurement), this vessel was the wonder of the surrounding region because of her great size. There is a tradition on the coast of Maine that the fishermen of neighboring towns often went as far as 40 or 50 miles in their vessels to see her after she was rigged. This, too, is one of the first block models made in Maine for a shipbuilder's use.

Gift of James B. Crawford. Cat. No. 76,125 U.S.N.M.

Block model of merchant ship.

A wooden, carvel-built keel ship, with full round bow above load water line, somewhat sharper below; stem straight and almost vertical above water, curved below; moderate rise to floor; wall side; rather long, well-shaped run; heavy square stern; medium sheer.

Dimensions of vessel.—Length, over all, 132 feet 8 inches; beam, 30 feet 8 inches; depth, 17 feet 4 inches; about 300 tons, old measurement. Scale of model, three-eighths inch equals 1 foot.

Gift of James B. Crawford. Cat. No. 76,126 U.S.N.M.

Block model of merchant ship.

This model was made by Samuel Pattee, of Bath, Me., about 1830, and from it Thomas Harwood, Esq., built a ship (name unknown) for the cotton trade, to run between New Orleans and other ports of the Southern States and Europe. At that date the principal traffic in cotton was between New Orleans and Liverpool. This model represents the type of ship employed in the cotton trade in the period between 1820 and 1840. The chief object sought was large underdeck capacity for cargo.

A wooden, carvel-built, keel ship; full bluff bow; wall side; round, easy bilge; long floor; very short, full run; square stern; rather straight on top; model roughly made of pine; mounted and painted as ships were painted about 1830.

Dimensions of ship.—Length over all, 131 feet; beam, molded, 28 feet; depth, molded, 18 feet. Scale of model, one-half inch equals 1 foot.

Gift of William P. Pattee. Cat. No. 76,067 U.S.N.M.

Block model of merchant ship.

The ship *Glasgow*, of Bath, Me., was built at that city from this model in 1836. The model is an excellent representative of the typical American cotton-carrying ship of the period between 1835 and 1845. The *Glasgow* was a fine ship for the date when she was built. For many years she was employed chiefly in the cotton trade between New Orleans and Liverpool.

This vessel was built with a full, bluff bow; curving under below water line; round, easy bilge; long floor; straight wall side; short, full run; no overhang to counter; heavy, square stern; monkey rail on quarter; fair amount of sheer. She has a short, full head with broad headrails; trail boards with gilded scroll work; a curved stem which rakes a good deal below water line. Model, mounted and painted in style of 1836, green (verdigris) bottom, black top with three narrow white beads and one broad varnished strake; gilded scroll on stern; name in gilt on quarter and head rail.

Dimensions of vessel.—Length over all, 138 feet; between perpendiculars, 135 feet; beam, 31 feet 2 inches; depth, 19 feet; tonnage, 594 54/95 tons (old measurement). Scale of model, one-half inch equals 1 foot.

Gift of William P. Pattee and F. W. Weeks.

Cat. No. 76,066 U.S.N.M.

Block model of merchant ship.

A ship (name unknown) was built from this model at Bath, Me., about 1850, for the cotton trade. The model represents the class of ships built about 1850 for the cotton-carrying trade between Southern ports of the United States and Europe. This business demanded ships of large capacity, and speed was a matter of secondary importance. Little advance was made in designing cotton ships in the period between 1835 and 1855, but later a better combination of capacity and speed was secured.

This vessel had a full, bluff bow, flaring very much at top; long, flat floor; rather quick turn to bilge; straight wall side; short, full run, with generally convex lines; light, square stern; good sheer. The stem and sternpost have very little rake. Painted in style of 1855.

Dimensions of vessel.—Length over all, 183 feet 4 inches; beam, molded, 33 feet; depth, molded, 25 feet. Scale of model, three-tenths inch equals 1 foot.

Gift of William P. Pattee. Cat. No. 76,068 U.S.N.M.

Block model of merchant ship.

A wooden, carvel-built, half clipper ship; bow moderately sharp at water line and below but convex, flares strongly at top; stem almost straight, with little rake; medium length of head; long low floor; high wall side; with considerable tumble in; rather long but convexly full run: vertical sternpost, square stern: fair amount of sheer. Named "*Mayflower*."

Dimensions of vessel.—Length over all, 131 feet 4 inches; beam, 26 feet 8 inches; depth, 20 feet. Scale of model, three eighths inch equals 1 foot.

A vessel of this form would carry a very large cargo on a given tonnage, old measurement, and would sail fairly well. The model is painted like the ship built from it—black top, with broad white band and imitation port holes of black; metal bottom.

Gift of Bath Board of Trade. Cat. No. 160,148 U.S.N.M.

Block model of merchant ship.

The ship *John N. Cushing*, of Newburyport, Mass., was built from this model at that city in 1853 and was employed in the European and West India trades. Ships of this class were noted more for large carrying capacity (on a given tonnage) than for speed, and, though very slow, were in favor with some merchants, inasmuch as they were considered more profitable for general freighting than swifter vessels.

The *John N. Cushing* was a wooden, carvel-built, keel ship; deep and narrow; with full, round bow; flaring and very round at top; long, flat floor; straight wall side; short, full run; heavy, square stern; very straight on top.

Dimensions of vessel.—Tonnage, 633; length over all, 154 feet; beam, 28 feet; depth, 24 feet. Scale of model, one-fourth inch equals 1 foot.

Gift of John N. Cushing. Cat. No. 76,062 U.S.N.M.

Block model of clipper merchant ship.

The famous clipper ship *Comet* was built from this model at New York in 1851 by her designer, William H. Webb. She represents the ideas of that celebrated builder for producing a sailing ship of extraordinary speed and fair carrying capacity—such a ship as was required for the California and China trades at that time.

The model is fitted with deck houses, etc., to show the arrangement of deck and position of lower masts, mounted on a mirror to show both sides of deck. It has a sharp bow, with moderate flare at top, rather full midship section, long, lean run, and square stern. Her rather full midship section gave her power and capacity, while her fine lines forward and aft made her very swift. Her angle of entrance is 45°, angle of run 75°, rise of floor 2½ inches to 1 foot.

Dimensions of ship.—Length on deck, stem to aft side of sternpost, 229 feet; extreme beam, 42 feet; depth from keel to deck plank, 24 feet 10 inches; tonnage, 1,836. Scale of model, one-third inch equals 1 foot.

The *Comet* was celebrated for the swift passages she made, some of which were very remarkable. Her first voyage was made from New York to San Francisco in 103 days, thence to Hong Kong in 37 days. On her return voyage she ran 332 knots in 24 hours, and 1,512 knots in 120 consecutive hours. On two occasions she made the passage from San Francisco to New York in 86 and 76⅜ days, respectively. She ran from New York to Liverpool in 19 days, and from Liverpool to Hong Kong in 84 days. Such performances are little less than marvelous for a sailing ship.

Gift of William H. Webb. Cat. No. 76,072 U.S.N.M.

Block model of clipper merchant ship.

This model is fitted with deck houses, stub masts, keel, rudder, stem, head, etc., and painted and mounted on a mirror to show both sides of the deck.

The famous clipper sailing ship *Young America* was built from this model at New York by her designer, William H. Webb, in 1853. She was employed chiefly in the California and Australia trades in which she carried passengers and freight to the new settlements and returned in ballast or loaded to Liverpool or New York. She was a wooden keel, sailing ship, with long sharp bow, flaring above, slightly concave at and below the water line; stem nearly straight, and with little rake; long head, decorated with American flags; short floor; full midship section; long, well-shaped run; nearly vertical sternpost; light round stern; moderate sheer.

Dimensions of vessel.—Length, between perpendiculars, 236 feet 6 inches; beam, 42 feet; depth, keel to deck, 28 feet 3 inches; registered tonnage, 1,962; angle of entrance, 45°; angle of run, 55°; dead rise to foot, 2 inches. Scale of model, one-third inch equals 1 foot.

The *Young America* was a very swift and popular ship, which made many quick voyages. She made five passages from San Francisco to New York in from 83 to 92 days, and on one occasion the voyage was made in 83 days, loaded; five trips were made in from 97 to 101 days. Once she ran from New York to Liverpool in 18 days, and returned in 23 days. She ran from Liverpool to Melbourne, Australia, in 81 days; once from Liverpool to San Francisco in 99 days, and from San Francisco to Liverpool in 102, 103, 105, and 106 days.

The speed of these clipper ships was often phenomenal. "The *Red Jacket* made 325 miles a day for a week; the *Flying Cloud* once sailed 427½ miles in 24 hours; the *James Bains*, an Australian packet, built by McKay at Boston, once sailed 420 miles in 24 hours; and the *Sovereign of the Seas*, it is said, made 437 miles in 24 hours!"[13]

Gift of William H. Webb. Cat. No. 160,135 U.S.N.M.

---

[13] Shipbuilding Industry of the United States, by Henry Hall.

Block model of merchant ships.

The ships *Exporter* and *Reporter*, of Newburyport, Mass., were built from this model at that city in 1874. They were designed for the general ocean-carrying trade and were good representatives of the type of American ships called "half-clippers," which succeeded the clipper ships that flourished in the period known as the "fifties" (between 1850 and 1860), when the trans-Atlantic and California sailing packets and the "tea clippers" of the China trade became famous. In the half-clipper model the object has been to unite large capacity with a degree of speed only second to that of the extreme clipper.

They were wooden, carvel-built, keel vessels, with sharp flaring bow; long, low, flat floor; high wall side; finely shaped run: moderate overhang to counter; square stern; medium sheer. Model is painted like ships built from it.

Dimensions of vessels.—Length between perpendiculars, 199 feet 6 inches; beam, 38 feet 2½ inches; depth, 24 feet; gross tonnage, 1,369.76. Scale of model, one-quarter inch equals 1 foot.

Gift of Sumner, Swasey & Currier. Cat. No. 76,054 U.S.N.M.

Block model of merchant ship.

The ship *Oregon* was built from this model by William Rogers at Bath, Me., in 1875. Three other ships, namely, the *Hercules*, *C. C. Thompson*, and *Highland Light* have been built from the same model.

A wooden, carvel-built, keel vessel, with moderately sharp, flaring bow; slightly concave lines below water; long, flat floor; quick bilge: wall side; rather long, finely shaped run; overhanging counter; square stern; good sheer. Model mounted with stub bowsprit, cutwater, stem, keel, sternpost, rudder, quarter rail, and bow chock attached. The ship's name is in gilt on bow and quarter and there is a gilt vine on the trailboard of the head.

Dimensions of vessel.—One thousand four hundred and thirty-one tons register; length between perpendiculars, 205.9 feet; beam 30.9 feet; depth, 24.01 feet. Scale of model, one-third inch equals 1 foot.

The *Oregon* has been employed in the general ocean carrying trade of the world. Her form represents the highest attainment of naval architects to combine great carrying capacity with a high rate of speed. She is what is technically called a "half-clipper" ship, a type that came into favor after the clipper sailing ships were superseded as packets by steamers and were no longer profitable because of their small capacity. The proportions of the *Oregon* have been so carefully considered that, while carrying a large cargo she sails nearly as fast as the famous ships of a former period.

Gift of William Rogers. Cat. No. 76,065 U.S.N.M.

Block model of merchant ship.

A wooden sailing ship (name unknown) was built from this model at Boston, Mass., in 1876. The design is that of a "half-clipper" ship and represents the highest combination of carrying capacity and speed at the date when it was made.

A wooden, carvel-built, keel ship, with convexly sharp bow, flaring strongly above; recurved slightly raking stem; long, low (almost flat), floor; quick turn to bilge; high wall side; moderately long well-formed run; vertical sternpost; rather light elliptical stern; good sheer.

Dimensions of ship.—Length over all, 172 feet; beam, 31 feet 4 inches; depth, 20 feet 8 inches. Scale of model, three-eighths inch equals 1 foot.

This style of sailing ship is much more profitable than a clipper ship would be, for, while the cargo capacity is large and the freight-earning capabilities are correspondingly increased, the sailing qualities are good, and second only to those of the extreme clipper.

Gift of R. G. F. Candage. Cat. No. 160,150 U.S.N.M.

Block model of merchant ship.

This model was exhibited at the World's Exposition, New Orleans, 1884–5, as the type of a Canadian-built wooden sailing ship, designed for the cotton trade between New Orleans and Europe. It closely resembles in form ships built about that date in the United States for the same trade, but has less sheer.

It has a moderately full convex bow; flaring above; long, rather flat floor; rounding bilge; wall side; finely-shaped run; round stern; very little rake to stem and sternpost; straight on top. Model mounted and fitted with long head, stem, keel, sternpost, and rudder. Stern ornamented with gilt scroll.

Dimensions of vessel.—Length on load water line, 202 feet; beam, 40 feet; depth of hold, 24 feet 6 inches; rise of floor, 20 inches; tonnage, 1,650; dead-weight capacity, 2,200 tons. Scale of model, one-third inch equals 1 foot.

Gift of W. Powers. Cat. No. 76,094 U.S.N.M.

Block model of merchant bark.

The bark *William Shroeder*, of Newburyport, was built from this model in 1836. She was designed for the West India trade and represents the highest type of clipper vessel employed in that trade at the time she was built. She ran chiefly between New England ports and Porto Rico, carrying cargoes of lumber to the island and returning with sugar, etc. After being in this business 10 or 12 years she was sold to Salem and engaged in the Zanzibar trade.

The bow was rather full and flaring, with low, rounding, easy bilge; long floor; straight side; a good length of run and easy after lines; broad, square stern; very little sheer; curved stem; stem and sternpost have only a moderate rake. Mounted, top painted black with white strake and painted ports; white molding on the stern; bottom bronzed to imitate copper; rudder, keel, head, etc., painted like the vessel.

Dimensions of vessel.—Length over all, 131 feet 8 inches; beam, 26 feet 8 inches; depth, 15 feet. Scale of model, three-tenths inch equals 1 foot.

Gift of Capt. Charles M. Bayley. Cat. No. 76,050 U.S.N.M.

Block model of merchant bark.

The bark *Edward Koppisch*, of Newburyport, was built from this model at Newbury, Mass., in 1845. She was specially designed for trading between New England and the West Indies, and was thus employed for 12 years; running chiefly to Porto Rico with lumber and bringing back sugar, etc. She was then sold to Salem and engaged in the African trade.

The bow is full and flaring, with low, long floor; round, easy bilge; long, straight sides; medium length of run; heavy, square stern. She has very little sheer; curved, raking stem; a moderate rake to the sternpost, and a "monkey rail" fore and aft. Mounted, painted black on top with white strake and painted ports, bottom bronzed, stub bowsprit, figurehead, stem, keel, etc., painted.

Dimensions of vessel.—Length over all, 125 feet; beam, 23 feet 4 inches; depth, 13 feet 4 inches; 250 tons. Scale of model, three-tenths inch equals 1 foot.

Gift of Capt. Charles M. Bayley. Cat. No. 76,049 U.S.N.M.

Block model of "kettle-bottom" merchant bark.

The merchant bark *Saone*, of Bath, Me., was built at that city from this model in 1846. She was designed for the general ocean-carrying trade, but more particularly for the European, West Indian, and South American trades.

The bow is swelling and full, with long, rather flat floor; round, easy bilge; tumble-in wall side; short, full run; heavy, square stern; comparatively little sheer.

Dimensions of vessel.—Registered tonnage, 292; length on deck, stem to taffrail, 116 feet 10 inches; beam, molded at upper deck, 21 feet 9 inches; depth, molded, 16 feet 9 inches; swell of sides, 20 inches; coefficient of midship section to 11$\frac{1}{6}$ feet, or about two-thirds depth from keel, 0.89 per cent; coefficient of displacement, 0.69 per cent; angle of run at load line, 95°, diminishing below to 20°;

carrying capacity, to 14 feet draft of water above top of keel, 460 tons of cargo. Scale of model, three-eighths inch equals 1 foot.

The *Saone* was one of the extreme types of the American "kettle-bottom" merchant vessel, the special characteristics of which were unusual depth, round bottom, tumble-in sides, and consequent narrow beam at the upper deck, with full swelling lines below. The object of this design was to secure the greatest carrying capacity on a given tonnage, since the onerous "tonnage dues" in foreign ports bore heavily on American ships. By the tonnage laws in force in the United States at that time the depth of a vessel for tonnage was estimated from her width on deck, and the deeper she was in proportion to her beam the more cargo capacity she would have on a given measurement. Such vessels were, however, slow and unwieldy. It is related of the *Saone* that she was loaded with lumber when new and, not having any ballast in her bottom, her buoyancy was so excessive that she sat high out of water and had little stability after she was filled with cargo. When she filled away from the wharf at Bath she fell over on her side so that her yardarms were almost in the water; her cargo had to be taken out and ballast put underneath it before she could go to sea.

Gift of William P. Pattee. Cat. No. 76,071 U.S.N.M.

Block model of merchant bark.

The bark *Hesper* was built from this model at Newburyport, Mass., in 1851. She was of the "kettle-bottom" type, and was employed in the European trade by John N. Cushing, sr.

This model has a full, bluff bow, flaring very much at top; long, low, flat floor; round, easy bilge; straight, tumble-in wall side; very short full run; heavy, square stern; straight on top. The general features are great depth and little beam, with full lines.

Dimensions of vessel.—Tonnage, 392; length over all, 128 feet; beam, 25 feet; depth, 21 feet. Scale of model, one-fourth inch equals 1 foot.

Gift of John N. Cushing. Cat. No. 76,059 U.S.N.M.

Block model of merchant bark.

The bark *Crusader* was built for the European trade from this model in 1854, at Millbridge, Me.

This was a wooden, carvel-built, keel vessel of the so-called "half-clipper" type, with moderately sharp, convex bow, flaring strongly at top; stem nearly straight and vertical above, curved at forefoot; long, low floor; round bilge; wall side; rather short full run; vertical sternpost; square stern; straight on top.

Dimensions of vessel.—Length over all, 216 feet; beam, 28 feet; depth, 19 feet. Scale of model, one-fourth inch equals 1 foot.

The *Crusader* engaged in the general ocean-carrying trade for several years, but finally was burned at sea between Rio de Janeiro and London. She cost $85,000.

Gift of Capt. Austin Dyer. Cat. No. 76,114 U.S.N.M.

Block model of merchant bark.

The bark *Julia*, of Ellsworth, Me., was built from this model at that port in 1877. She was designed for the general ocean-carrying trade, chiefly between ports of the United States and foreign countries.

A wooden, carvel-built, keel vessel; moderately sharp convex bow; flaring strongly at top; long head; raking stem; long flat floor; wall side; fine run; elliptical stern; strong sheer.

Dimensions of vessel.—Length over all, 164 feet; between perpendiculars, 155 feet 1 inch; beam, 34 feet; depth, 20 feet 1 inch; net tonnage, 758.18. Scale of model, one-sixteenth inch equals 1 foot.

This bark is a good example of the half-clipper type of wooden merchant ships built in New England for the foreign ocean-carrying trade, and which succeeded the clipper packets of an earlier date. The extreme clippers, like the *Young America* and *Comet*, found profitable employment in the trans-Atlantic passenger traffic until driven out by steam. Subsequently the California and Australia trades and the tea trade of China furnished employment for clipper ships, but these fields of enterprise were soon occupied to a greater or less extent by steamers, with the result that the modern sailing ship had to be built to carry a large cargo. Designers had, however, succeeded in combining considerable speed with large capacity, as in this vessel.

Gift of Isaac M. Grant. Cat. No. 76,134 U.S.N.M.

Block model of merchant bark.

The clipper wooden sailing bark *Albemarle*, of Baltimore, was built from this model by Messrs. William Skinner & Sons for Messrs. Wedber & Dickenson. She was launched on June 19, 1878, and was employed in the coffee trade, for which she was designed, running between Rio de Janeiro and American ports. She was much celebrated for her speed and was one of the swiftest of the sailing clippers in the Rio coffee trade.

This model has a sharp, strongly flaring bow; rather short and flat amidships; rounding bilge; wall side; long, lean run; broad and rather light elliptical stern; nearly vertical sternpost; stem has a strong reflex curve projecting at top.

Dimensions of vessel.—Length between perpendiculars, 135 feet; beam, 30 feet; depth of hold, 14 feet 11 inches; tonnage, 560. Scale of model, one-half inch equals 1 foot.

Gift of William Skinner & Sons. Cat. No. 76,095 U.S.N.M.

Block model of merchant brig.

The brig *Dove*, of Newburyport, was built from this model in 1817 at the adjoining town of Newbury.

The model has a full bluff bow above water line, finer below; long floor; round, easy bilge, the general shape of the bottom, in cross section, being strongly convex; short and moderately full run; square stern; curved stem; considerable sheer. Mounted and painted in style of the period when the *Dove* was built; head, stem, keel, and rudder painted.

Dimensions of vessel.—Length over all, 76 feet; beam, molded, 18 feet 6 inches; depth, molded, 10 feet. Scale of model, one-half inch equals 1 foot.

The *Dove* was built for the West India trade. At that date the West Indies were infested by pirates, and frequently the safety of a merchant vessel and the lives of her crew depended solely on her ability to outsail the freebooters. It therefore was important to construct West Indiamen on comparatively easy lines, so that they would sail well. It is interesting to note that the model of the *Dove* is much sharper on the floor and at the bow and stern than the ordinary merchantman of that period. Indeed, vessels built for the carrying trade 20 or 30 years later were made on fuller lines and with greater proportional capacity. The flaring bow of the *Dove* is an early instance of this feature of construction, which was carried to an extreme in the clipper ships built about 35 years later.

Gift of John N. Cushing. Cat. No. 76,061 U.S.N.M.

Block model of merchant brig.

Thomas Harwood, Esq., built a hermaphrodite brig (name unknown) from this model in 1825 at Bath, Me. The vessel was especially designed for the trade between New England and the West Indies Islands. In this trade it was customary to carry cargoes of sugar, molasses, etc. Vessels like that built from this model usually had short, high quarter decks, and, because the main deck was considerably lower than the quarter, were called "low-decked vessels." The cabin was generally in a rather high trunk or house on the quarter-deck, and the crew's quarters were commonly in a small deck house forward, an arrangement that permitted the utilization of all the space below deck for the storage of cargo.

The model has a round, full bow; long, "barrel bottom," with round easy bilge; good run; square stern; rather strong sheer; curved stem; painted in the style that vessels of this class were painted when the model was made.

Dimensions of vessel.—Length over all, 91 feet; beam, molded, 22 feet; depth, molded, 9 feet. Scale of model, one-half inch equals 1 foot.

Gift of William P. Pattee. Cat. No. 76,070 U.S.N.M.

Block model of merchant brig.

The brig *Powhatan*, of Newburyport, Mass., was built from this model at Newbury in 1829, and the brig *Pocahontas* was built from it at the same place in 1830. These vessels were employed in the carrying trade between Europe and the United States. They were owned by John N. Cushing, sr., a noted merchant of Newburyport, and were the pioneer vessels of the famous fleet of square-rigged brigs owned by this gentleman, and employed chiefly in the trans-Atlantic trade.

The model has a full, bluff bow; wall side; low bilge; long, nearly flat floor; short, full run; rather small, square stern; straight on top.

Dimensions of vessel.—Length over all, 113 feet; beam, molded, 25 feet; depth, molded, 18 feet; tonnage, 268 old measurement. Scale of model, one-fourth inch equals 1 foot.

Gift of John N. Cushing. Cat. No. 76,060 U.S.N.M.

Block model of "kettle-bottom" merchant brig.

The square-rigged brig *Palos*, of Newburyport, Mass., was built from this model at the adjoining town of Newbury in 1832. There is authority for stating that a dozen or more other brigs were built from the same model at later dates, these ranging in size from 270 to 299 tons (old measurement), and in date of construction from 1833 to 1845. Among them were the *Carthage*, *Athens*, *Corinth*, *James Gray*, *Nicholas*, *James Caskie*, *Ark*, *Massachusetts*, *Salisbury*, *Smith*, *Tuttle*, and *Keying*, the latter being the last one built from this design. These constituted the one-time famous Cushing's fleet of "kettle-bottom" brigs.

The *Palos* was a wooden, carvel-built, keel vessel, with very full bluff bow, nearly square above, but hollow near forefoot; long, low, flat floor; rather short turn to bilge; high, straight, tumble-in side; extremely short run; no overhang to counter; heavy, square stern; sternpost rakes slightly; stem straight and nearly vertical, except at forefoot, where it curves; model painted like the vessel.

Dimensions of vessel.—Tonnage (old measurement), 277; length over all, 109 feet; beam, 24 feet; depth, 20 feet. Scale of model, one-fourth inch equals 1 foot.

Spars.	Length (feet).	Diameter.	Length of head.	Rake.
Mainmast	62	20 inches at deck	8 feet 6 inches.	1¼ inches to foot.
Foremast	58	20½ inches at deck	8 feet 6 inches.	¾ inch to foot.
Bowsprit	28	12½ inches at bow		
Main topmast	33½	12½ inches in cap	5 feet	
Fore-topmast	33	12 inches in cap	5 feet	
Main topgallant mast.	19½	7½ inches in cap	3 feet	
Fore-topgallant mast.	19½	7 inches in cap	3 feet	
Main royal mast	12	5¼ inches in cap	6-foot pole.	
Fore royal mast	12	5 inches in cap	5-foot pole.	
Jib boom	28	12½ inches in cap		

	Length.	Diameter in slings.	Length of arm outside lift.
	Feet.	*Inches.*	*Inches.*
Main yard	46	13	24
Main topsail yard	36½	10¼	26
Main topgallant yard	24½	6¼	15
Main royal yard	17	4	9
Fore yard	46	12½	24
Fore-topsail yard	36½	9¾	26
Fore-topgallant yard	24	5¾	15
Fore royal yard	16	3½	9

Nine hundred and fifty sheets of copper were used to copper her bottom.

Cushing's fleet traded chiefly to Europe and the West Indies, a favorite voyage being to carry a cargo of tobacco to Europe from Richmond, Va., and return with a cargo of salt from Liverpool, or of hemp, cordage, and other products from Russia. It is related of one of them that on one occasion she landed a cargo of 700 tons of coal at Jamaica which she had brought from Cardiff. This was a remarkable capacity for a vessel of less than 300 tons, old measurement. The brig *Keying*, built in 1845, and one of the last of the fleet, cost $22,264.98, when ready for sea.

Gift of John N. Cushing. Cat. No. 76,058 U.S.N.M.

Block model of merchant brig.

The hermaphrodite brig *Amethyst* was built from this model at Sullivan, Me., in 1838 for the West Indian and coastwise trades.

She was a wooden, carvel-built, keel vessel with full round bow, long low floor, wall side, short full run, heavy square stern, medium sheer.

Dimensions of vessel.—Length between perpendiculars, 82 feet 7 inches; beam, 22 feet 9½ inches; depth, 8 feet 6 inches. Scale of model, one-half inch equals 1 foot.

Gift of D. A. Simpson. Cat. No. 76,127 U.S.N.M.

Block model of merchant brig.

The square-rigged brig *Chenamus*, of Newburyport, was built from this model at Newbury in 1841. She was owned by Messrs. John N. Cushing and H. Johnson, and was employed in trading on the northwest coast of America, particularly in the Columbia River region. She was specially designed for this and may be taken as a fair type of the fuller class of merchant vessels engaged in that trade between 1840 and 1850.

The *Chenamus* was a wooden, carvel-built, keel vessel, with full, flaring bow, almost square at rail: long, low floor; wall side with considerable tumble in; short, full run; heavy, square stern; little sheer.

Dimensions of vessel.—Length, over all, 97 feet; beam, 20 feet; depth, 12 feet 9 inches; tonnage, 202, old measurement. Scale of model, five-sixteenths inch equals 1 foot.

Gift of John N. Cushing. Cat. No. 76,057 U.S.N.M.

Block model of clipper merchant brig.

This model represents the extreme type of American clipper brig of the period between 1840–1850. These vessels had a heavy drag (the draft forward being only about half of that aft), and were rigged with a strong rake to their masts (often a line dropped from the main truck would fall aft of the taffrail). They were exceedingly swift, especially when close-hauled, and had a world-wide fame.

The model has a sharp bow, with straight or convex lines; high, rising floor; long, easy turn to bilge; long, rather lean run; heavy, square stern; rather straight on top; greatest beam on deck about one-third the length from stem. The stem and sternposts have a strong rake. The model is mounted and fitted with keel, stem, sternpost, short head, and square-heeled rudder; also with stub bowsprit, monkey rail, davit, cathead, etc., illustrating the style of fitting vessels of this class at the period when it was made. It is painted to represent the prevailing style of painting this class of vessels. The bronze on the bottom imitates copper.

Dimensions of vessel.—Length over all, 112 feet; beam, molded, 26 feet 8 inches; depth, molded, 12 feet; tonnage, 255, old measurement. Scale of model, three-eighths inch equals 1 foot.

This model was made at Baltimore in January, 1845, for John N. Cushing, of Newburyport, Mass. It was for a clipper square-rigged brig, intended to be employed in trading on the northwest coast of America, but was never constructed, probably because of Mr. Cushing's well-known prejudice in favor of fuller vessels, with greater carrying capacity.

The following estimate of the cost of building and rigging a vessel is copied from a card attached to the model by the builder at the time it was made, and which still remains intact:

"I can furnish a vessel, as per model, about 255 tons, at the following rates:

Hull and spars		$6,400
Blacksmith's	(bill)	500
Rigging		850
Blockmaker's	(bill)	200
Joiner's	“	375
Rigger's	“	240
Plumber's	“	150
Copper, etc	“	2,050
		$10,765

Gift of John N. Cushing. Cat. No. 76,064 U.S.N.M.

Block model of merchant brig.

The brig *Watson* was built from this model at Sedgewick, Me., in 1846, and is typically representative of a numerous class of small single-deck hermaphrodite brigs constructed in Maine about that time for the West Indian and coastwise trades. She was only 146 tons, gross measurement, but was considered a "large vessel" at the time she was built.

She was a wooden, carvel-built, keel vessel with full convex bow; raking convexly curved stem; short full figurehead; long, rather low floor; run well formed and of medium length; heavy square stern; good sheer.

Dimensions of vessel.—Length over all, 90 feet; beam, 22 feet; depth of hold, 8 feet 6 inches. Scale of model, one-half inch equals 1 foot.

The *Watson* was employed chiefly in the West Indian trade, carrying out cargoes of lumber and bringing back sugar and molasses, and in freighting hard pine lumber from South Atlantic points to North Atlantic ports.

Gift of Joshua Watson. Cat. No. 76,140 U.S.N.M.

Skeleton model of merchant brig.

The brig *Telula* was built from this model at Cherryfield, Me., in 1848, and was employed chiefly in the coastwise trade.

The *Telula* was a wooden, carvel-built, keel vessel; with full strongly convex bow; curved stem; long low floor; short full run; square stern.

Dimensions of vessel.—Length, over all, 104 feet; beam, 29 feet 4 inches; depth, 10 feet 8 inches. Scale of model, three-eighths inch equals 1 foot.

Skeleton models like this were commonly used at Cherryfield as late as 1840, after which block models were gradually adopted. These skeletons were called "crow's nest models" and "hawk's nest models" by the builders at Cherryfield.

There are no exact data available to determine the size of the vessel. The dimensions given, based on measurements of the model, are believed to be nearly correct.

Gift of G. R. Campbell & Co. Cat. No. 76,124 U.S.N.M.

Block model of merchant brig.

The hermaphrodite brig, *Iscarian*, was built from this model at Trenton (now Lamoine), Me., in 1852 by Hamen Cousins. She was designed for the West Indian and coastwise trade, with special reference to carrying lumber.

This was a wooden, carvel-built, keel vessel; with bow flaring, full and rounding above water line, much finer below; raking curved stem; short full head; considerable rise to floor; long finely shaped run; heavy square stern; symmetrical sheer.

Dimensions of vessel.—Length, 94 feet 8 inches; beam, 26 feet; depth, 9 feet 2 inches; 198 $\frac{34}{95}$ tons, old measurement. Scale of model, three-eighths inch equals 1 foot.

Gift of C. L. Young. Cat. No. 76,131 U.S.N.M.

Block model of merchant brig.

The brig *Abby Watson* was built from this model at Sedgewick, Me., in 1852. She represents the most advanced ideas of Maine naval architects of that period in designing and building vessels of this class for the West Indian and coastwise trades.

This was a wooden, carvel-built, keel vessel, with strongly flaring convex bow, moderately sharp at and below water line; full at rail; long low floor; quick turn to bilge; moderately long full run; heavy square stern; fine sheer.

Dimensions of vessel.—Length, 109 feet 9½ inches; beam, 27 feet; depth of hold, 9 feet 3½ inches; gross tonnage, 213.87.

The *Abby Watson* was employed in the West Indian trade for several years, afterwards chiefly in the coastwise trade. She was lost off Cape Hatteras with all her crew about 1876.

Gift of Joshia Watson. Cat. No. 76,141 U.S.N.M.

Block model of merchant brig.

An hermaphrodite was built from this model at Bath, Me., in 1852, for the West Indian and coastwise trades.

She was a wooden, carvel-built, keel vessel, with full convex bow; raking convexly curved stem, short full head; long floor with considerable rise; easy quarter-deck; good sheer.

Dimensions of vessel.—Length over all, 91 feet 6 inches; depth of hold, 7 feet. Scale of model, one-half inch equals 1 foot.

Gift of William P. Pattee. Cat. No. 160,123 U.S.N.M.

Block model of merchant brig.

The hermaphrodite brig *Fredonia* was built from this model at Ellsworth, Me., in 1854, chiefly for the West Indian trade.

She was a wooden, carvel-built, keel vessel, with moderately sharp, convex flaring bow; long, low floor; wall side; medium length of run; square stern; good sheer. Scale of model, one-half inch equals 1 foot.

The *Fredonia* is noticeably longer in proportion to her width than the vessels of her class commonly built in Maine at the same period. In this respect she resembles vessels built 30 years later.

Gift of Abraham Lord. Cat. No. 76,135 U.S.N.M.

Block model of merchant brig.

The hermaphrodite brig *Anita Owen*, of New York, was built from this model at Millbridge, Me., in 1856. She was designed and built by the late Capt. Ezekiel Dyer for the West Indian trade, in which she was chiefly engaged for a number of years. This was a wooden, carvel-built, keel vessel with moderately sharp convex bow, strongly flaring at top; reflex curve to stem; long head; long, low, round floor; rather long and well-formed run; heavy, square stern; good sheer.

Dimensions of vessel.—Length over all, 117 feet; beam, 27 feet 5 inches; depth, 13 feet 6 inches. Scale of model, five-sixteenths inch equals 1 foot.

The *Anita Owen* cost $20,000 when new; she was considered a fine vessel of her class. She was lost about 1870.

Gift of Capt. Austin Dyer. Cat. No. 76,115 U.S.N.M

Block model of merchant brigs.

The hermaphrodite brigs (or brigantines) *George Latimer* and *Alexander Kirkland* were built from this model about 1858 at Baltimore, Md., for the West Indian trade, and were employed in the sugar trade for some years.

This model has a sharp bow with only moderate flare; long floor with little rise; round bilge; fine aftersection; heavy, square stern, symmetrical sheer; wall side; medium rake to stem and sternpost.

Dimensions of vessel.—Length over all, 109 feet; beam, 24 feet; depth, molded, 11 feet. Scale of model, one-half inch equals 1 foot.

Gift of William Skinner & Sons. Cat. No. 76,099 U.S.N.M.

Block model of merchant brig.

The merchant brig *Hurricane Bird* was built from this model in 1858 at Baltimore for the West Indian trade. She was rigged as a brigantine or hermaphrodite brig and represents the type of merchant vessels built at that time. They were remarkable for an extraordinary flare at the bow.

The model has a moderately sharp and strongly flaring bow; long floor with medium rise; long and rather lean run; thin, square stern. She has little sheer, the sternpost is nearly vertical, and the stem has a strong reflex curve, projecting forward very much at the top.

Dimensions of vessel.—Length over all, 109 feet; beam, 26 feet; depth of hold, 10 feet. Scale of model, one-half inch equals 1 foot.

Gift of William Skinner & Sons. Cat. No. 76,100 U.S.N.M.

Block model of merchant brig.

The brig *Eva M. Johnson* was built from this model at Harrington, Me., in 1867, for the West Indian and general coastwise trades; the hermaphrodite brig *Mary E. Pennel* was also built from the model in 1868.

The *Johnson* was a wooden, carvel-built, keel vessel, with moderately sharp convex, flaring bow; stem nearly vertical below water line, curving outwardly above; long low floor; wall side; short full run; light elliptical stern; good sheer.

Dimensions of vessel.—Length between perpendiculars, 110 feet; beam, 28 feet 1 inch; depth, 11 feet 2 inches. The *Eva M. Johnson* was 235.84 tons, net tonnage, and the *Mary E. Pennel* had a net tonnage of 239.01. Scale of model, three-eights inch equals 1 foot.

Gift of V. L. Coffin. Cat. No. 76,118 U.S.N.M.

Block model of merchant brig.

The hermaphrodite brig *Antelope* was built from this model at Harrington, Me., in 1866. She was designed for and employed in the West Indian and coastwise trades. She was launched in July and the brig *Gazelle*, built on the same lines, was launched in September of the same year.

The *Antelope* was a wooden, carvel-built, keel vessel, with full, convex, flaring bow; slightly raking stem; long head; long, low, flat floor; round bilge; wall side; short but well formed run; square stern; good sheer.

Dimensions of vessel.—Length over all, 117 feet; between perpendiculars, 113 feet 9 inches; beam, 28 feet 3½ inches; depth, 14 feet. The *Antelope* was 329.92 tons, gross tonnage, and the *Gazelle* was 326.37 tons gross. Scale of model, three-eighths inch equals 1 foot.

After being used several years, the *Antelope* was lost at Delaware Breakwater. She was a good specimen of the large class of deep-sea-going brigs built in Maine during the sixties.

Gift of V. L. Coffin. Cat. No. 76,117 U.S.N.M.

Block model of merchant brig.

The hermaphrodite bring *Minnie Smith* was built from this model at Millbridge, Me., in 1871. She was designed principally for the West Indian trade.

This was a wooden, carvel-built, keel vessel, with moderately sharp, convex, flaring bow; stem inversely curved; long head; long floor, with easy turn to bilge; run of medium length but rather full; square stern; moderate sheer.

Dimensions of vessel.—Length over all, 140 feet 10 inches; beam, molded, 24 feet 10 inches; depth, 13 feet 2 inches. Scale of model, five-sixteenths inch equals 1 foot.

This vessel, which cost $20,000, was lost within a year after its completion while entering the port of Salerno, Italy.

Gift of Capt. Austin Dyer. Cat. No. 76,116 U.S.N.M.

Block model of merchant brig.

The hermaphrodite brig, *I. W. Parker*, of Belfast, Me., was built from this model in 1874, by C. P. Carter & Co. She was designed for the general carrying trade, either foreign or coastwise, but was specially adapted to the West Indian trade (carrying lumber from New England and bringing return cargoes of sugar and molasses), for which business vessels of this class were in favor. They have been largely, if not entirely, superseded in the general coasting trade by three masted and four masted schooners.

The *Parker* was a wooden, carvel-built, keel vessel, with moderately sharp, flaring bow; low, rather flat floor; easy turn to bilge; high wall side; rather long, but comparatively full run; light square stern; strong sheer; very little rake to stem and sternpost.

Dimensions of vessel.—Length over all, 128 feet; beam, molded, 27 feet 4 inches; depth, 16 feet. Scale of model, three-eighths inch equals 1 foot.

Gift of C. P. Carter & Co. Cat. No. 76,075 U.S.N.M.

Skeleton model of merchant topsail schooner.

Prior to 1794 skeleton models like this were exclusively used in shipbuilding. In the year named, block models were first introduced in the shipyards on the Merrimac—at Newburyport, Mass., and vicinity. The use of block models gradually spread, but in some localities, notably in certain shipbuilding sections of Maine, old and experienced designers and builders preferred skeleton models until about the middle of the nineteenth century.

The two-masted topsail schooner, *Ruth Thomas*, was built from this model at Frankfort, Me., in 1845 for the coastwise and West Indian trades. The *Thomas* was a wooden, carvel-built, keel schooner, with full round bow; curved raking stem; long low floor; rather long fine run; heavy square stern; good sheer.

Dimensions of vessel.—Length over all, 88 feet; between perpendiculars, 83 feet 7 inches; beam, 24 feet 2 inches; depth, 7 feet 6 inches. Scale of model, one-half inch equals 1 foot.

Schooners of this type usually had short and high quarter decks and were called "low decked vessels," because their main deck was so much lower than the quarter. The topsail schooner rig was much in favor on the lumber coaster of Maine for a long period. Some of these vessels had only one square sail, the topsail, but generally they carried a topsail and topgallant sail; and a large square sail, reaching from the foreyard nearly to the rail, was not uncommon. After 1850 the rig was less used, and finally it was entirely discarded by builders.

Gift of F. L. Tyler. Cat. No. 76,143 U.S.N.M.

Block model of topsail schooners.

The topsail schooners *Arrowsic* and *Eagle* were built from this model (the former in 1847) at Arrowsic Island in the Kennebec River, Me.

The model has a round, full, flaring bow; round, easy bilge; moderate rise to floor; rather fine after lines; heavy, square stern; medium rake to stem and sternpost; strong sheer; painted like vessels of the *Arrowsic* type at the date she was built. Scale of model, one-half inch equals 1 foot.

Vessels of this class were employed chiefly in carrying lumber from Maine to other sections of the Atlantic coast of the United States. They were made wide and comparatively shallow, with high quarter-deck and deep bulwarks. This form, known as the "low-decked" type, was specially well adapted to the lumber trade, in which a large part of the cargo was stowed on deck. The topsail schooners usually carried a square topsail, topgallant sail, and square sail, with fore-and-aft rig on mainmast. Some of the vessels, however, had only a topsail and no other square sails.

The old style of "toggling" builder's models to hold sections together has been preserved in this. This method was adopted when block models were first used. It was superseded by screwing the "lifts" together, but more recently many designers glue the sections into one block, and the lines are taken off by a mechanical device specially invented for that purpose.

Gift of William P. Pattee. Cat. No. 76,069 U.S.N.M.

Block model of three-masted schooner.

The three-masted centerboard schooner *Nellie S. Pickering*, of Belfast, was built from this model in 1870 by C. P. Carter & Co., and the next year the schooner *Fame Gorham* was also built from the model. These vessels were specially designed for the lumber trade of Jacksonville, Fla., and are very shallow, with no drag. This form enables them to carry a large cargo on a light draft, so that, when loaded, they pass easily over the bar of the St. Johns River.

The *Pickering* was a wooden, carvel-built, centerboard schooner, with moderately sharp flaring bow; long, low flat floor, with short turn to bilge; short but finely shaped run; broad, square stern; strong sheer.

Dimensions of vessel.—Length over all, 136 feet; beam, 32.9 feet; depth of hold, 9.3 feet; spars; masts, 77, 78, and 79 feet long; topmasts each 48 feet; bowsprit, outboards, 20 feet; jib boom, outside cap, 30 feet; spanker boom, 48 feet. Scale of model, three-eighths inch equals 1 foot.

Gift of C. P. Carter & Co. Cat. No. 76,078 U.S.N.M.

Block model of three-masted schooner.

The three-masted merchant schooners *James M. Riley* and *Susan P. Thurlow*, were built from this model at Harrington, Me., in 1872. They were designed for the West Indian trade in winter and for the coastwise trade in summer.

The *Riley* was a wooden, carvel-built (probably centerboard) vessel with moderately sharp strongly flaring bow; long head; recurved stem; long, flat floor; quick turn to bilge; wall side; short, well-formed run; square stern; fine sheer.

Dimensions of vessel.—Length over all, 133 feet 10 inches; between perpendiculars, 126 feet 5 inches; beam, 31 feet 1 inch; depth, 16 feet 7 inches; net tonnage, 440.07. Scale of model, three-eighths inch equals 1 foot.

The *Riley* was lost at Fortune Islands in 1886.

Gift of V. L. Coffin. Cat. No. 76,119 U.S.N.M.

Block model of three-masted schooner.

The three-masted schooner *John Bird*, of Rockland, was built from this model by C. P. Carter & Co., of Belfast, Me., in 1872. She was a single-deck vessel, and was designed for the general coasting trade, but chiefly to carry cargoes of lime.

This schooner had a moderately sharp, flaring bow, with slightly concaved lines below water line; low floor; rather easy bilge; long run; light, square stern; good sheer.

Dimensions of vessel.—Length over all, 130 feet 8 inches; between uprights, 125 feet; beam, 30 feet; depth, 10 feet; waist, deck to top of rail, 4 feet. Scale of model, three-eighths inch equals 1 foot.

Gift of C. P. Carter & Co. Cat. No. 76,076 U.S.N.M.

Block model of three-masted schooner.

The three-masted keel schooner *William Frederic*, of Belfast, Me., was built at that city from this model in 1874 by C. P. Carter & Co. She was intended for the general coasting and West Indian trades. Being a keel vessel and deeper than usual, she was well adapted to the sugar and molasses trade and was easy and safe in a seaway. She was framed with hardwood (chiefly beech, maple, and birch) and hackmatack, and planked with hard or yellow pine. The model is painted in imitation of the vessel that was built from it.

The vessel has a moderately sharp, flaring bow; low floor; wall side; good run; light, square stern; rather strong sheer. The model is deep in proportion to length and beam as compared with the ordinary type of coasting schooner.

Dimensions of vessel.—Length over all, 137 feet; on keel, 130 feet; beam, 32 feet; depth, 15 feet; net tonnage, 430.38; length of spars, foremast, 76 feet; mainmast, 77 feet; mizzenmast, 78 feet; bowsprit, 34 feet (22 feet outboard); jib boom, outside cap, 30 feet; topmasts, each 50 feet; fore and main booms, each 35 feet; spanker boom, 53 feet. Scale of model, three-eighths inch equals 1 foot.

On October 4, 1895, this vessel was abandoned at sea in a sinking condition, in a northeast gale, while on a passage from Saltilla River, Ga., to Belfast, Me. The crew of seven men were taken off by a boat from the steamer *Franklin*, bound to Boston, Mass., from Baracoa, Cuba. The rescue was effected at great risk, the men on the schooner being compelled to jump into the sea, as the boat could not board the vessel.

Gift of C. P. Carter & Co. Cat. No. 76,074 U.S.N.M.

Block model of three-masted schooner.

The three-masted schooner *Meyer and Muller* was built from this model at Belfast, Me., in 1883. She was specially designed for the lumber trade of the South Atlantic and Gulf States and also for trading to foreign ports in the Gulf of Mexico. She was therefore made very shallow and wide, so that she might carry a large cargo on a light draught, which was very essential for this trade, since the harbors of the South were generally shallow and difficult to enter with a deep vessel.

A wooden, carvel-built, centerboard schooner, with rather full, flaring bow; low, flat floor; short turn to bilge; long, lean run; heavy, square stern; strong sheer.

Dimensions of vessel.—Length over all, 163 feet; keel, 140 feet; beam, 34 feet; depth of hold, 10 feet; spars: masts, 88, 89, and 90 feet long; topmasts, each 52 feet; bowsprit, outside, 24 feet; jib boom, outside cap, 26 feet; fore and main booms, each 41 feet; spanker boom, 52 feet; 10 to 12 feet outside taffrail. Scale of model, three-eighths inch equals 1 foot.

Gift of C. P. Carter & Co. Cat. No. 76,077 U.S.N.M.

Block model of three-masted schooner.

The three-casted centerboard schooner, *William C. French*, was built from this model at Newburyport, Mass., in 1883, by Atkinson & Filmore. She has been employed chiefly in the coal trade, and besides having a good carrying capacity, she is swift. The model illustrates about the highest attainment in modern naval architecture for combining speed with large capacity on a moderate draught. The strong sheer on top is desirable to keep the ends well above water when the vessel is deeply laden with coal or other heavy freight.

The *French* was a wooden, carvel-built, centerboard schooner, with moderately sharp bow; low flat floor; quick turn to bilge; nearly perpendicular side; rather long, lean run; overhanging counter; broad, square stern. She had a strong sheer on top, considerable rake to the stem; curved forefoot, and nearly vertical sternpost.

Dimensions of vessel.—Length over all, 149 feet 4 inches; between perpendiculars, 142 feet 4 inches; beam, 33 feet 8½ inches; depth, 11 feet 11 inches; net tonnage, 387.75. Scale of model, three-eighths inch equals 1 foot.

This vessel made three consecutive passages, immediately after she was built, between New England and Cape Breton, a distance of 675 miles, in 72, 56, and 66 hours respectively, her average speed being nearly 10½ knots an hour; also a passage from Philadelphia to Boston, dock to dock, in 56 hours, fully loaded.

Deposited by Atkinson & Filmore. Cat. No. 76,048 U.S.N.M.

Block model of two-masted schooner.

The two-masted coasting schooner *Watchman* was built from this model at Tinker's Island, Me., in 1847, for the general coasting trade, but more especially for carrying lumber from Maine to other States along the Atlantic coast.

She was a wooden, carvel-built, keel vessel, with full, round flaring bow; raking curved stem; short full head; long low floor; round bilge; short full run; heavy, square stern; good sheer.

Dimensions of vessel.—Length over all, 80 feet; beam, 22 feet 6 inches; depth of hold, 7 feet. Scale of model, one-half inch equals 1 foot.

Gift of Joshua Watson. Cat. No. 76,109 U.S.N.M.

Block model of two-masted schooner.

The two-masted low-decked schooner *Marcia Tribou* was built from this model in 1847 at Bucksport, Me., for the West Indian and coastwise trades.

She was a wooden, carvel-built, keel vessel, with full, convex, flaring bow; raking curved stem; short full head; long floor with moderate rise; short, well-formed run; heavy square stern; considerable sheer; short and high quarter-deck.

Dimensions of vessel.—Length over all, 88 feet 6 inches; beam, 23 feet; depth, 8 feet. Scale of model, one-half inch equals 1 foot.

Gift of John Swazey. Cat. No. 76,155 U.S.N.M.

Block model of two-masted schooner.

The schooner *Lucy* was built from this model at Sargentville, Me., in 1852. She was employed in the general coastwise trade, chiefly in carrying lumber, and was finally lost at sea.

She was a wooden, carvel-built, keel vessel; wide and comparatively shallow; full, round flaring bow; raking curved stem; short full head; long low floor; short full run; very heavy square stern; short high quarter-deck; good sheer.

Dimensions of vessel.—Length over all, 85 feet; between uprights, 77 feet; beam, 23 feet 3½ inches; depth, 7 feet 1¾ inches. Scale of model, one-half inch equals 1 foot.

Gift of Robert Dority. Cat. No. 76,138 U.S.N.M.

Block model of two-masted schooner.

The schooner *Wakeag* was built from this model at Lamoine, Me., in 1855, for the Atlantic coast and West Indian trades.

She was a two-masted, wooden, keel schooner, with moderately sharp, convex bow, strongly flaring above; reflex curved stem; long low floor; short full run; vertical sternpost; large square stern; very little sheer.

Dimensions of vessel.—Length over all, 102 feet; between perpendiculars, 90 feet; beam, 25 feet 2⅓ inches; depth, 8 feet 5½ inches. Scale of model, one-third inch equals 1 foot.

The *Wakeag* is typically representative of a class of comparatively small two-masted coasting schooners built in eastern Maine in the sixth decade of the nineteenth century. An important object in the design was to secure large carrying capacity with special reference to the stowage of lumber.

Gift of Hamen Cousins. Cat. No. 76,129 U.S.N.M.

Block model of two-masted schooner.

The two-masted schooner *J. W. Hale* was built from this model at Brooklin, Me., in 1855. She was designed for the general coasting trade, but more particularly for carrying lumber.

She was a wooden, carvel-built, keel vessel; wide and shallow, with bow moderately sharp at and below water line and flaring and full above; raking curved stem; long head; long low floor; round easy bilge; long straight of breadth; short but well-formed run; heavy, broad, square stern; good sheer.

Dimensions of vessel.—Length over all, 87 feet; beam, 23 feet; depth, 7 feet 6 inches. Scale of model, one-half inch equals 1 foot.

The *J. W. Hale* was employed chiefly in carrying lumber from Florida to North Atlantic ports, but made two trips to the West Indies, and was finally lost in a gale off Cape Hatteras about 1859.

Gift of Moses B. Day. Cat. No. 76,136 U.S.N.M.

Block model of lumber schooner.

The lumber-coasting schooner *North Star* was built from this model at Sullivan, Me., in 1856. She was designed by Richard Simpson and intended for carrying lumber from ports of eastern Maine to Boston, Mass., and other western points. She is typically representative of a class of small, full-bowed vessels constructed for the New England lumber trade between 1840 and 1860.

The *North Star* was a wooden, carvel-built, keel vessel, with a full convex bow; rather low long floor; long straight side; short but well-formed run; heavy square stern; good sheer.

Dimensions of vessel.—Length, 60 feet 6 inches; beam, 18 feet 7 inches; depth, 6 feet 6 inches. Scale of model, one-half inch equals 1 foot.

Vessels of this class were among the smallest of lumber coasters. They usually had short high quarter-decks, and a large part of the cargo was stowed on deck, lumber being piled several feet above the main rail.

Gift of D. A. Simpson. Cat. No. 76,128 U.S.N.M.

Block model of two-masted schooner.

The two-masted schooner *R. B. Sumner* of Newburyport, Mass., was built from this model in 1858, and represented the most advanced ideas in the design of coasting vessel. She was employed in the general carrying trade, chiefly along the Atlantic coast of the United States, and had the reputation of being a swift vessel for that class.

The *Sumner* had a moderately sharp bow; long, low floor; long, finely shaped run; full, square stern; good sheer; moderate rake to stem and sternpost.

Dimensions of vessel.—Length over all, 88 feet; beam, molded, 21 feet, 4 inches; depth, molded, 8 feet 8 inches. Scale of model, three-eighths inch equals 1 foot.

Gift of Sumner, Swasey & Currier. Cat. No. 76,052 U.S.N.M.

Block model of two-masted schooner.

The two-masted schooner, *Aaron*, was built from this model by J. Kennedy at Lubec, Me., in 1858. She was designed for the West Indian and coasting trades.

She was a wooden, carvel-built, keel vessel, with moderately full flaring bow; raking stem; long head; long, round floor; rather long but full run; nearly plumb sternpost; heavy square stern; medium sheer.

Dimensions of vessel.—Length over all, 108 feet 9 inches; beam, 32 feet 10 inches; depth, 14 feet 5 inches. Scale of model, five-sixteenths inch equals 1 foot.

The *Aaron* was employed chiefly in the West Indian fruit trade for some time after she was built. Subsequently she freighted fish from eastern Maine to more southern Atlantic ports and was finally lost on a voyage to Africa.

Gift of J. Kennedy. Cat. No. 76,122 U.S.N.M.

Block model of two-masted schooner.

The two-masted coasting schooner, *Charmer*, of Newburyport, Mass., was built from this model at that city in 1860. She was employed as a sailing packet between Newburyport and Boston, for which service a light-draught, swift-sailing vessel was required. Her lines were taken from the schooner, *Iowa*, which was built at Baltimore, Md., about 1840, and the model really represents the advanced ideas of Baltimore builders at that date. The *Iowa* had preceded the *Charmer* as a packet, and both vessels were celebrated for their sailing and working qualities.

The *Charmer* had a moderately full, convex bow; sharp floor; easy bilge; lean run; light, square stern; strongly raking stem and stern post; comparatively little sheer.

Dimensions of vessel.—Length over all, 81 feet; on keel, 61 feet; beam, 21 feet 6 inches; depth, 6 feet 9 inches; tonnage, 116. Scale of model, one-half inch equals 1 foot.

Gift of Sumner, Swasey & Currier. Cat. No. 76,053 U.S.N.M.

Block model of two-masted schooner.

A two-masted schooner (name unknown) was built from this model at Newburyport, Mass., in 1860, for the general coastwise trade. She was a wooden, carvel-built vessel, with rather full, flaring bow; easy bilge; medium length of run; light, square stern; moderate sheer.

Dimensions of vessel.—Length over all, 106 feet; beam, 24 feet; depth of hold, 10 feet. Scale of model, three-eighths inch equals 1 foot.

This style of two-masted schooner was a very favorite type for the general coasting trade of the Atlantic about 1860 to 1865, but was later superseded by the larger three-masted and four-masted types.

Gift of E. P. Goodwin. Cat. No. 76,051 U.S.N.M.

Block model of two-masted schooner.

The schooner *E. Closson*, of Bangor, Me., was built from this model at Sedgewick, Me., in 1860, for the coastwise lumber trade. She was a poop-deck vessel, a feature of her construction that is not shown on the model.

The *Closson* was a wooden, carvel-built, keel schooner, with strongly flaring bow, full at rail, moderately sharp at and below water line; recurved raking stem; long head; long and rather low floor; short but well-formed run; heavy square stern; good sheer.

Dimensions of vessel.—Length between perpendiculars, 95 feet 6 inches; beam, 26 feet 3½ inches; depth, 8 feet 11 inches; net tonnage, 135.37. Scale of model, one-half inch equals 1 foot.

Gift of Robert Dority. Cat. No. 76,137 U.S.N.M.

Block model of two-masted schooner.

The two-masted schooner *Ada S. Allen*, of Eastport, Me., was built from this model at Dennysville, Me., in 1867. She was a wooden, carvel-built, keel vessel with moderately sharp, convex, flaring bow; raking stem, curved at forefoot; long floor with moderate dead rise; rather long, well-formed run; square stern; good sheer.

Dimensions of vessel.—Length over all, 98 feet; between perpendiculars, 94 feet; beam, 27 feet; depth, 9 feet 7 inches; net tonnage, 142.25. Scale of model, one-half inch equals 1 foot.

The *Ada S. Allen* represents the best type of lumber coasting schooner of moderate dimensions of her time. Little or no improvement has since been made in this class of vessels.

Gift of William Welch. Cat. No. 76,123 U.S.N.M.

Block model of two-masted schooner.

The two-masted schooner *Mountain Laurel* was built from this model at Trenton (now Lamoine) Me., in 1868, for the general coastwise trade. She was a wooden, carvel-built, keel vessel, closely resembling in type the New England fishing schooners of the period. She had a moderately sharp convex bow, flaring slightly at top; raking curved stem; long head; long floor with little dead rise; long but full run; heavy square stern; medium sheer.

Dimensions of vessel.—Length over all, 96 feet: between perpendiculars, 88 feet 7 inches; beam, 25 feet 7 inches; depth, 8 feet 4½ inches; tonnage, 141.74. Scale of model, three-eighths inch equals 1 foot.

Gift of Hamen Cousins. Cat. No. 76,130 U.S.N.M.

Block model of two-masted schooner.

The merchant schooner *Mabel F. Staples*, of Machias, Me., was built from this model at Harrington, Me., in 1869, and was employed in the general coastwise trade, particularly lumber and coal. In 1871 the schooner *Alzena* was also built from the model.

The *Staples* was a wooden, carvel-built, keel vessel, with moderately sharp, convex, and strongly flaring bow; curved raking stem: long, low floor: round, easy bilge; wall side; short, rather full run; straight, nearly vertical sternpost; light, elliptical stern; good sheer; long, low quarter-deck.

Dimensions of vessel.—Length over all, 124 feet 9 inches; between perpendiculars, 108 feet 5 inches; beam, 27 feet 11 inches; depth, 11 feet 3½ inches; net tonnage, 268.16. Scale of model, five-sixteenths inch equals 1 foot.

The *Mabel F. Staples* was lost at Nassau, September, 1887, and the *Alzena* was lost at Porto Rico in April, 1886.

Gift of V. L. Coffin. Cat. No. 76,121 U.S.N.M.

Block model of two-masted schooner.

The schooner *William H. Archer*, of Plymouth, Mass., was built from this model at Ellsworth, Me., in 1871, for the general coasting trade. The schooner *Lenora* was also built from the model two years later. Both were wooden, carvel-built, keel vessels, with convexly sharp flaring bow: raking stem; moderate rise to floor; rather long, easy run; square stern; and symmetrical sheer.

Dimensions of vessel.—Length over all, 89 feet: between perpendiculars, 85 feet: beam, 25 feet: depth of hold, 7 feet; net tonnage, 90.69. Scale of model, one-half inch equals 1 foot.

The *Archer* represents the highest attainment in designing small, two-masted coasting schooners in Maine at the date when she was built. In her, good carrying capacity was combined with excellent sailing qualities.

Gift of Isaac M. Grant. Cat. No. 76,133 U.S.N.M.

Block model of coasting schooner.

The schooner, *D. S. Lawrence*, was built from this model at Ellsworth, Me., in 1871. In 1875 the schooner, *City of Ellsworth*, was built from the same lines, but slightly enlarged. Both vessels were designed for small coasters, to carry freight chiefly along the coast of New England.

They were wooden, carvel-built, keel, two-masted schooners, with a convexly sharp bow; slightly raking stem; long head; moderate rise to floor; rather long well-formed run; very wide flat counters; broad and heavy square stern; medium sheer; very little drag.

Dimensions of vessel.—Length between perpendiculars, 71 feet; beam, 23 feet 3 inches; depth of hold, 6 feet 6 inches; net tonnage, 66.39. Scale, one-half inch equals 1 foot.

Gift of Isaac M. Grant. Cat. No. 76,132 U.S.N.M.

Block model of two-masted schooner.

From this model the two-masted schooner, *Helen*, of New York, was built for the coastwise trade at Harrington, Me., and launched in June, 1874. Subsequently, two other vessels, the *Alta V. Cole* and *Pojara*, were built from the model; the former being launched in November, 1874, and the latter in October, 1875.

The *Helen* was a wooden, carvel-built vessel, with moderately sharp convex, flaring bow; raking stem; long low floor; short well-formed run; heavy elliptical stern; medium sheer; long low quarter. The style was something like the clipper fishing vessels of the period but somewhat fuller.

Dimensions of vessels.—Length over all, 119 feet 2 inches; between perpendiculars, 104 feet; beam, 28 feet 11 inches; depth of hold, 7 feet 1⅕ inches. Scale of model, five-sixteenths inch equals 1 foot.

The three vessels built from this model were all employed in the West Indian and Atlantic coast trades. The *Alta V. Cole* was lost in Salem Harbor December, 1886, and the *Pojara* was lost on her first voyage on Green Key, West Indies, December 18, 1875.

Gift of V. L. Coffin. Cat. No. 76,120 U.S.N.M.

Block model of two-masted schooner.

The two-masted schooner *Hunter*, of Rockland, Me., was built from this model at Orland, Me., in 1876. She was designed for the general coastwise trade, with special reference, however, to carrying cargoes of lime. She was a wooden, carvel-built, keel vessel, with convexly sharp flaring bow; slightly raking stem; long head; long, low floor; quick turn to bilge; moderately long, well-formed run; broad, square long low quarter deck; medium sheer.

Dimensions of vessel.—Length between perpendiculars, 105 feet 6 inches; beam, 28 feet 1 inch; depth, 9 feet 2½ inches; net tonnage, 187.22. Scale, three-eighths inch equals 1 foot.

Gift of Harry H. Buck. Cat. No. 76,152 U.S.N.M.

RIVER CRAFT.

Model of Ohio River flatboat.

The model represents a square-ended, flat-bottomed scow, built of hewn logs fastened together with treenails; covered with a rectangular house built of boards or planks, with two small square windows on each side, and three double hatches on top for the reception of cargo, or for reaching the quarters of the crew below deck. Fitted with rude oarlocks, for rowing or steering, made of the crotch of a sapling or tree branch. Oars were made by fastening an oblong piece of board to a long curved handle.

Dimensions of boat.—Length over all, 80 feet; beam, 20 feet; depth, 6 feet; length of house, 76 feet; width, 20 feet (it is flush with the sides and stern of the scow); extreme height, 9 feet 6 inches. Scale of model, one-half inch equals 1 foot.

Boats of this type were the "ships" of the western rivers in the early days of the settlement of the Ohio and Mississippi Valleys.

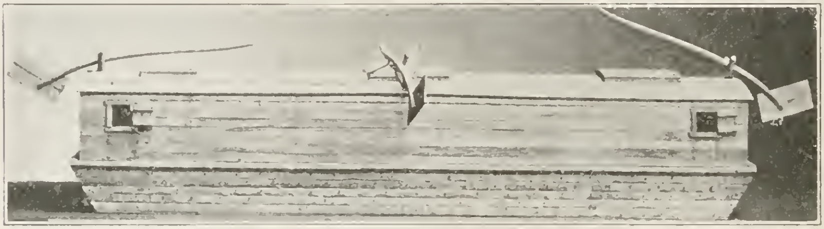


FIG. 19.—OHIO RIVER FLATBOAT.

The early emigrants traveled down the Ohio River on such craft, carrying their belongings, including live stock, so that these rude fabrics had much to do with the successful settlement of the Southern and Western States bordering the Ohio and Mississippi Rivers. The products of this section were transported to New Orleans and to other markets on flatboats prior to the advent of the steamboat. The flour of the western mills found its way to market chiefly on these boats. The flatboat was intended to make only one trip, since it was impracticable to propel it back against the current of the rivers. When it reached its destination, and its cargo had been discharged, it was sold for lumber, broken up, and used for other purposes, while its crew returned home by land.

Made in the Museum. Cat. No. 160,304 U.S.N.M.

Model of Ohio River keel boat.

This type of boat was used on the Ohio River, prior to the advent of the steamboat, for the transportation of flour and other products.

It was a flat-bottomed, carvel-built, decked vessel, with vertical sides and square, vertical stern; full, convex, nonflaring bow; straight stem; shallow keel along each side of bottom; straight on top. Deck consisted of a long, narrow house, with two doors and two small windows on each side.

Dimensions of boat.—Length, 60 feet; beam, 12 feet; depth, 6 feet; length of house, 42 feet; width, 8 feet; height, 7 feet. Scale of model, one-half inch equals 1 foot.

Made in the Museum. Cat. No. 160,305 U.S.N.M.

FIG. 20.—OHIO RIVER KEEL BOAT.

Model of horse treadmill ferryboat.

This boat was built at Hoboken, N. J., in 1813, by Col. John Stevens, to ply between that city and New York after the enforcement by Fulton of the monopoly granted him by New York State to navigate the waters of that State by steam.

Six horses attached singly, each to a separate sweep, walked in a circle, revolving a horizontal wheel which communicated the power to the paddle-wheel shaft by means of beveled gearing. The periphery of the wheel revolved at nearly the same speed that the horses walked.

Dimensions of vessel.—Two hulls 90 feet long and 16-foot beam were placed parallel about 8 feet apart, the intervening space being decked over, making a boat about 40 feet wide. A single paddle wheel 10 feet diameter, with paddles 6 feet wide, was placed between these hulls near the stern. Scale of model, three eighths inch equals 1 foot.

Two small cabins were located on the deck near the stern for passengers. Space for horses and carriages being on the forward end, the boat was compelled to move backward some distance from the dock, when the direction in which the horses were walking was reversed and the boat moved forward. These boats were used only a few years, when, Fulton's privilege being declared unconstitutional, steam ferryboats were again put on the Hoboken Ferry.

Made in the Museum. Cat. No. 160,402 U.S.N.M.

PILOT BOATS.

Block model of pilot boat.

The pilot boat, *Dancing Feather*, was built from this model at Boston, Mass., in 1853. She was a wooden schooner-rigged vessel and represents the extreme ideas of New England builders of that date as applied to small seagoing clippers. Her chief characteristics were a considerable depth and beam for her length; raking stem, giving a moderate overhang to the bow; round stern; and lines moderately easy, but generally convex. Pilot boats of this type were very seaworthy and swift. Old pilots claim that modern-built boats are not more comfortable in a gale, though much larger.

She had a sharp bow with straight or convex lines; high floor; lean run; round stern; very little overhang to counter; comparatively little sheer; raking curved stem.

Dimensions of vessel.—Length over all, 68 feet; beam, 20 feet; depth, 9 feet. Scale of model, one-half inch equals 1 foot.

Gift of D. J. Lawlor. Cat. No. 76,032 U.S.N.M.

Block model of pilot boat.

The Boston pilot boat, *Edwin Forrest*, was built at Boston from this model in 1865. She attained considerable celebrity for speed and stability. After being in the pilot service off Boston for many years she was sold to Pensacola, Fla., where she was employed as a pilot boat in 1885. She was designed by D. J. Lawlor, and is a wooden, schooner-rigged vessel of the highest specialized type of the date when she was built.

The *Forrest* had a long, sharp bow, wave-shaped at and below water line; high concave floor; long, lean run; rather light V-shaped stern; fine sheer; nearly straight vertical stem above water, curved at forefoot. Mounted, with stem, keel, and rudder attached.

Dimensions of vessel.—Length over all, 69 feet; beam, 18 feet 6 inches; depth, 8 feet. Scale of model, one-half inch equals 1 foot.

Gift of D. J. Lawlor. Cat. No. 76,047 U.S.N.M.

Block model of pilot boat.

The wooden pilot schooner *Florence*, of Boston, Mass., was built from this model at that city in 1867. She was designed by D. J. Lawlor and represents the highest development in New England pilot boats of that period, and illustrates further the influence upon the design of the shallow American yacht then in favor. She sailed well in ordinary weather, but was not so powerful in a gale as the deeper pilot boats.

This boat had a long, sharp bow; high rising floor; lean run; raking V-shaped stern; stem curved at forefoot, straight and raking moderately above water line; fine sheer; greatest beam a little forward of amidships. The *Florence* was rather shallow and sat low in the water, with little freeboard.

Dimensions of vessel.—Length over all, 71 feet 6 inches; beam, 19 feet; depth of hold 8 feet. Scale of model, one-half inch equals 1 foot.

Gift of D. J. Lawlor. Cat. No. 76,033 U.S.N.M.

Block model of pilot boats.

The New York pilot schooners *Phantom* and *Pet* were built from this model; the first named in 1868. The model was made by D. J. Lawlor.

The bow is long and sharp, with wave-shaped lines at and below load-water line, convex and slightly flaring above; sharp, straight floor; long, easy run; V-shaped raking stern; nearly vertical sternpost; curved stem, which rakes much more than is common in vessels of this class. There is a strong drag, a graceful sheer, and the greatest beam is about amidships.

Dimensions of vessel.—Length over all, 76 feet; beam, 20 feet; depth of hold, 10 feet. Scale of model, one-half inch equals 1 foot.

Gift of D. J. Lawlor. Cat. No. 76,039 U.S.N.M.

Block model of pilot boat.

The Boston pilot boat *Lillie* was built from this model at Boston in 1876. The vessel was designed and the model made by D. J. Lawlor. The *Lillie* is a wooden, schooner-rigged vessel. She is slightly fuller in the midship and after sections than pilot boats built a few years earlier, and the top tumbles in somewhat; the greatest width is at or below the water line.

This model has a long, sharp bow, convex above, moderately concave at and below water line; slightly hollow floor, which has less angle of rise than is common on pilot boats; long, easy run; deep, raking, V-shaped stern; stem straight and nearly vertical above water line; curved below; considerable sheer; greatest beam about amidships.

Dimensions of vessel.—Length over all, 74 feet; beam, 20 feet; depth, 9 feet. Scale of model, one-half inch equals 1 foot.

Gift of D. J. Lawlor. Cat. No. 76,038 U.S.N.M.

Block model of pilot boat.

The wooden schooner-rigged pilot boat *Hesper*, of Boston, Mass., was built from this model at Chelsea, Mass., in 1884. She was designed by D. J. Lawlor, and at the time she was built was probably the swiftest and ablest pilot boat in America. She was larger, relatively deeper, narrower, and had finer lines than vessels of this class previously built. She was ballasted with lead and iron, but carried no outside ballast.

The model has a long, sharp bow; slightly hollow, sharp floor; long lean run; V-shaped stern; very little rake to sternpost; stem nearly straight and almost vertical above water line, but curving below in a long easy sweep to join the keel about 18 feet aft of stem at water line. There is a strong sheer; the greatest beam is a little abaft the middle of load water line, from which point the bow tapers in a graceful curve, while the after section is easy, the stern not so wide as common on pilot boats.

Dimensions of vessel.—Length over all, 104 feet; on load water line, 96 feet; beam, 22 feet; depth, 12 feet 8 inches; draft aft, 13 feet 6 inches. Scale, three-eighths inch equals 1 foot.

Gift of D. J. Lawlor. Cat. No. 76,037 U.S.N.M.

Block model of pilot boat.

The schooner-rigged pilot boat *Glyn*, of Brunswick, Ga., was built from this model at Noank, Conn., in 1884. She was designed by G. L. Daboll.

The *Glyn* was a two-masted, wooden, carvel-built, keel vessel, with sharp, flaring bow; raking curved stem; long head; sharp floor; long, easy run; nearly vertical sternpost; heavy, V-shaped, raking stern; flush deck, good sheer.

Dimensions of vessel.—Length over all, 78 feet; on load water line, 68 feet; beam, 20 feet; depth, top of keel to top of deck, 9 feet 4 inches. Scale of model, one-half inch equals 1 foot.

This vessel had a high reputation for speed as compared with other pilot boats on the coast of Georgia. A marked characteristic of the design, and one noticeable in most of the Noank-built vessels of that period—yachts, pilot boats, and fishing smacks—was the comparatively strong rake of the stem and considerable flare of the bow above water. The heavy V-shaped stern was also a feature seen on many of the yachts built there in earlier years.

Gift of G. L. Daboll. Cat. No. 160,117, U.S.N.M.

YACHTS AND PLEASURE BOATS.

STEAM YACHTS.

Block model of steam yacht.

The American steam yacht *Adelita*, of Boston, was designed by D. J. Lawlor, of Chelsea, Mass., and built by him from this model in 1881. It is a typical representative of the very swift screw steam yachts of moderate dimensions that have met with much favor.

The *Adelita* was a wooden, carvel-built, schooner-rigged, screw-propeller vessel with long and very sharp bow; concave water lines;

high floor; short turn to bilge; long, finely-shaped run, with round stern and a long, overhanging counter. The vessel has a graceful sheer on top; its greatest beam is at or a little abaft of amidships, from which point it gradually tapers toward either end. The stem is straight and nearly vertical above water, curved and sloping to the keel below the water line.

Dimensions of vessel.—Length over all, 88 feet; between perpendiculars, 82 feet; beam, 16 feet; depth, 7 feet 9½ inches; gross tonnage, 55.09; net tonnage, 27.55. Scale of model, one-half inch equals 1 foot.

Gift of D. J. Lawlor. Cat. No. 76,031 U.S.N.M.

Block model of steam yacht.

This model, designed by D. J. Lawlor in 1884 for a large schooner-rigged auxiliary steam yacht, is very graceful in form and is a fine example of the most advanced ideas for such vessels at the period in which it was made.

The yacht has a long, sharp bow, with slightly hollow under-water lines; high, rising floor, with a little hollow, quick bilge, a trifle tumble in to top side; long, finely shaped run; long, overhanging counter; narrow, round "fantail" stern. She has a curved stem and projecting cutwater or "long head." The model is mounted on board with stem, stub-bowsprit, keel, sternpost, and a balance rudder attached. The latter is hung to a skag that projects from the keel.

Dimensions of vessel.—Length over all, 160 feet; extreme beam, 28 feet; depth, 15 feet. Scale of model, three-eighths inch equals 1 foot.

Gift of D. J. Lawlor. Cat. No. 76,042 U.S.N.M.

Block model of steam yacht.

The steam yacht *Princess* was built on the lines of this model in 1890 at Boston, Mass.

The *Princess* was a single-screw-propeller vessel, with long, sharp bow; stem straight and nearly vertical above water, curved below; sharp floor; round bilge; long, easy run, with skag; overhanging elliptical stern; moderate sheer.

Dimensions of yacht.—Length, for tonnage, 76 feet 5 inches; beam, 15 feet 2½ inches; depth, 6 feet 5 inches. Scale of model, three-fourths inch equals 1 foot.

The *Princess* is a typical representative of a large number of small schooner-rigged screw steam yachts built in the United States in the last two decades of the nineteenth century.

Cat. No. 76, 301 U.S.N.M.

Block model of steam launch.

The *Kara* was built for pleasure purposes about 1890 by Lawley & Son, South Boston, Mass. She was wooden, carvel-built, open steam launch, with single screw propeller, long sharp bow; upright cutter stem; rising floor; easy bilge; long fine run, with skag; overhanging round stern; good sheer.

Dimensions of launch.—Length over all, 46 feet; on load water line, 40 feet; beam, 6 feet; draft aft 3 feet 6 inches, forward 1 foot 3 inches; area of section, 28 square feet; speed, 10 miles an hour.

This launch was specially built for catching swordfish for pleasure, though she was used for general pleasure purposes.

Transferred from the Bureau of Fisheries. Cat. No. 76,300 U.S.N.M.

SAILING YACHTS.

Block model of schooner yacht.

This is the model of the schooner yacht *Coquette*, designed by Lewis Winde, a Swede, and built in 1846. The model was made by D. J. Lawlor, after the design of Winde, and is supposed to be accurate.

The vessel was a wooden, carvel-built, two-masted, keel schooner, with sharp bow with convex lines; very sharp floor; long run with straight or convex lines; light elliptical stern; sternpost nearly vertical; raking curved stem; moderate sheer and heavy drag. The *Coquette* sat low in the water. Its depth and wedge-shaped floor gave its lines rather easy convex curves, but the fullness in the lower part of the run made the buttock lines rather hard.

Dimensions of vessel.—Length over all, 67 feet; beam, 19 feet; depth amidships, 8 feet; draft aft 10 feet; forward 5 feet 6 inches. Scale of model, one-half inch equals 1 foot.

The *Coquette* became famous for outsailing the much larger New York sloop-yacht *Maria* in a beat to windward outside Sandy Hook. In the Century Magazine of July, 1883, the following allusion is made to the race:

"The *Coquette* was a little schooner of only 66 feet in length over all. But she drew 10 feet of water aft, having a sharp rising floor and sharp run. She was built by Winde, a Swede, at one time a member of Winde & Clinkard. When the *Coquette* beat the *Maria* it was on a wind, in a strong breeze and chop sea, which offered the worst possible chance for the latter vessel, which was so shallow that, notwithstanding her fine lines, she did not have sufficient momentum in a seaway to compete against a deeper craft."

A few years later the *Coquette* was sold to Boston and used as a pilot boat. She proved to be an excellent pilot boat, being swift and seaworthy, and many years after she went out of service the old pilots spoke enthusiastically of her fine qualities. The model has been mounted and painted in imitation of the vessel built from it.

This schooner is specially interesting, inasmuch as it conveys a good idea of the chief features which characterized the pilot boats of the forties and the old-time schooner-yachts of the New York Yacht Club. Like all sharp schooners of her time, she had strongly raking masts.

Gift of D. J. Lawlor. Cat. No. 76,040 U.S.N.M.

Block model of schooner yacht.

The wooden schooner yacht *Olata*, designed by D. J. Lawlor, was built by him from this model at East Boston, Mass., in 1853. In 1858 she was purchased by the New Orleans pilots and employed in the pilot service off the passes of the Mississippi River.

The *Olata* was a deep, beamy keel schooner, with sharp, flaring bow, wave-shaped water line; hollow, sharp floor; lean run; round stern; raking stem. The model has comparatively little sheer and its greatest beam is about one-third of the length from the stem.

Dimensions of vessel.—Length over all, 73 feet; beam, 20 feet 9 inches; depth, 10 feet. Scale of model, one-half inch equals 1 foot.

The *Olata* represents the most advanced ideas of New England yacht designers at the date when she was built. Her characteristic features are wave-shaped lines, heavy draft, and sharp, hollow floor. She was swift for that time and very weatherly. In 1856 she made the passage from Boston to St. Thomas, West Indies, with the American consul on board, in seven days, though only the mainsail and jib could be set because of some mishap soon after sailing. For some years she ran as a packet between Boston and Provincetown, Mass., and was a noted vessel at that time because of the ease with which she could outsail fishing schooners.

This model is interesting from the fact that it is one of the early designs made in New England for swift pleasure schooners.

Gift of D. J. Lawlor. Cat. No. 76,035 U.S.N.M.

Block model of cruising yacht.

This model was exhibited at the World's Exposition, New Orleans, in 1884–85. It represents the ideas of Canadian designers of that period, for a large sailing yacht intended for ocean cruising. The position of the masts suggests that the designers anticipated having a brig or brigantine rig. A vessel built from these lines would be easy and safe and would make a moderately swift cruiser.

It is long, deep, and narrow; long and very sharp bow; rising floor; rather quick bilge; long, sharp run; light, elliptical stern; very little sheer. Model mounted and fitted with stub masts and bowsprit, head, stem, keel, sternpost, and rudder.

Dimensions of vessel.—Length on load water line, 125 feet; beam, 25 feet; depth of hold, 12 feet; rise of floor, 20 degrees. Scale of model, one-third inch equals 1 foot.

Gift of W. Powers. Cat. No. 76,093 U.S.N.M.

Model of schooner yacht.

Wooden, carvel-built, two-masted keel schooner, with sharp bow; rising floor; square stern; raking stem. Rigging includes mainsail, foresail, jib, flying jib, fore-topmast staysail, foregaff-topsail, and main gaff-topsail.

Gift of Edward P. Casey. Cat. No. 263,233 U.S.N.M.

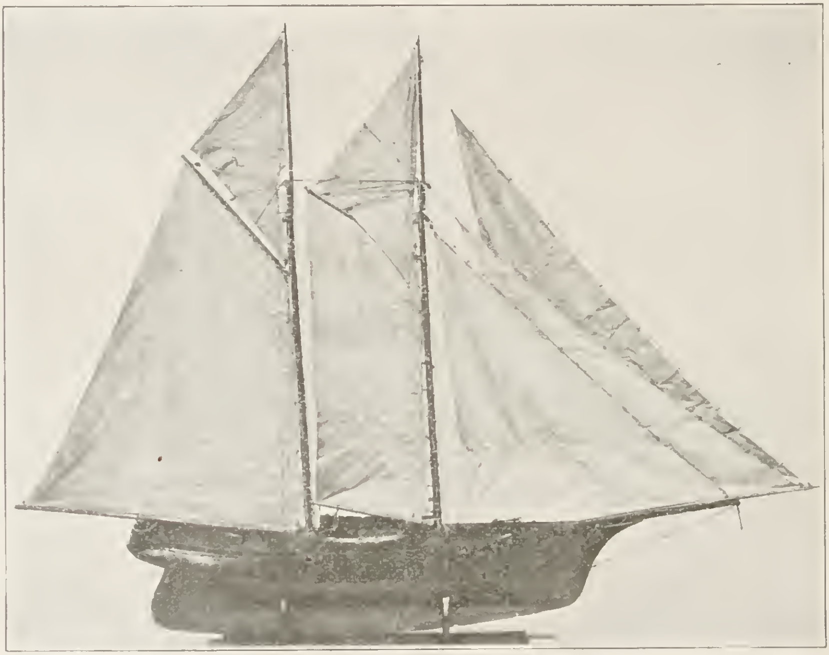


FIG. 21.—AMERICAN SCHOONER YACHT.

Model of sloop yacht.

Wooden, keel sloop with moderately sharp bow, slightly raking stem; moderate sheer; vertical sternpost; square stern. Rigging includes mainsail, jib, fore-topmast staysail, and gaff-topsail.

Gift of Edward P. Casey. Cat. No. 263,234 U.S.N.M.

Block model of schooner yacht.

Extreme clipper build, with long sharp bow. broad beam, long concave run, fine sheer, round stern with large overhang.

Dimensions of vessel.—Length over all, 100 feet; beam, 26 feet; depth, 9 feet 6 inches. Scale of model, one-half inch equals 1 foot.

Gift of C. B. Harrington. Cat. No. 54,462 U.S.N.M.

Model of cutter yacht, English type.

This model, which has been named *John Bull*, was intended by its maker, Capt. G. Melvin McLain, Rockport, Me., as a miniature of one of the deep, narrow, lead-keeled racing cutters, of the well-known British type in vogue about 1886 and earlier. The typical cutter had a straight and nearly plumb stem above water, though some, notably the *Minerva*, had the " Buttercup bow," such as is on this model, a designation due to the fact that a famous little English cutter named the *Buttercup* had a bow of this shape. The Scotch cutter *Thistle*, which raced for the "America's Cup" in 1887 had a bow somewhat similar.

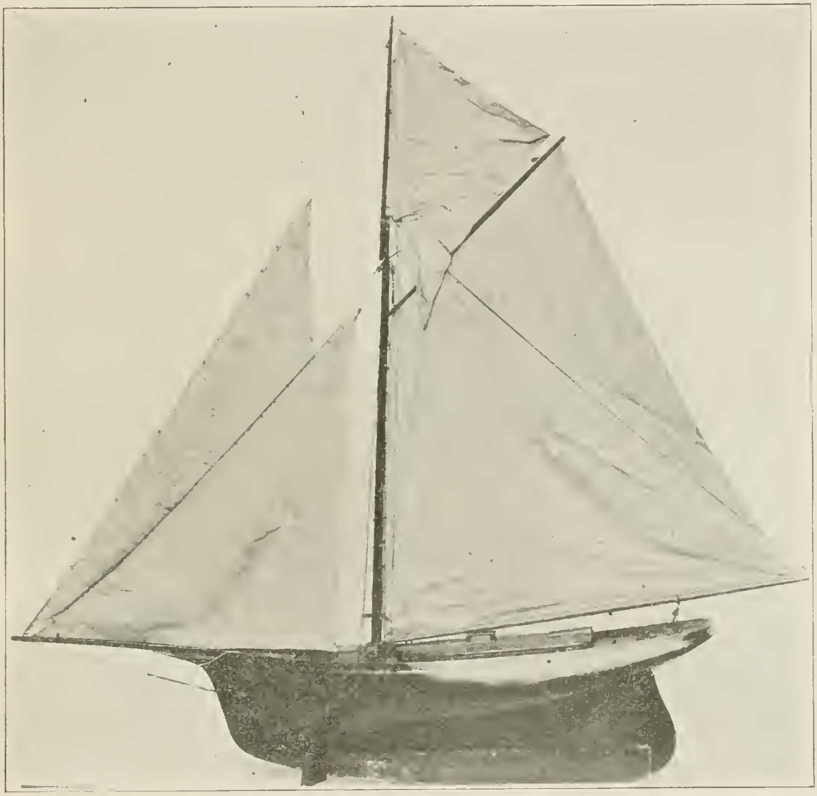


FIG. 22.—AMERICAN SLOOP YACHT.

A wooden, carvel-built, cutter-rigged keel vessel, with long sharp bow; raking, recurved stem; small gammon-knee head; sharp floor; wall side; very deep lead keel; long easy run; strongly raking sternpost; long, narrow, overhanging " fantail " stern; moderate sheer; flush deck; very low bulwarks; fitted with companionways, skylights, etc. All sails are set (excepting jib-headed gaff-topsail, which is furled on masthead), including jib topsail, club topsail, and spinnaker.

Dimensions of vessel.—Length over all, 98 feet; on load water line, 79 feet 6 inches; beam, 13 feet 6 inches; draft, extreme, 15 feet 6 inches; mast, above deck, 60 feet; topmast, heel to truck, 49 feet; main boom, 74 feet 6 inches; gaff, 46 feet; bowsprit, outboard, 38 feet. Scale of model, one-half inch equals 1 foot.

With the exception of the stem (which rakes on this model instead of being straight and plumb above water), this model is a close approximation in form to the *Genesta* and *Galatea*, the two English yachts which contested for the "America's Cup" in 1885 and 1886. Because of their excessive narrowness and depth, yachts of this type have been called "slice racers" Their stability depended entirely upon the lead on the keel. This form, which had its origin in taxing beam too heavily under British racing rules, was later abandoned, and more beam, less displacement, a greater centralization of weight, and long overhanging ends became the later "mode" in designing yachts.

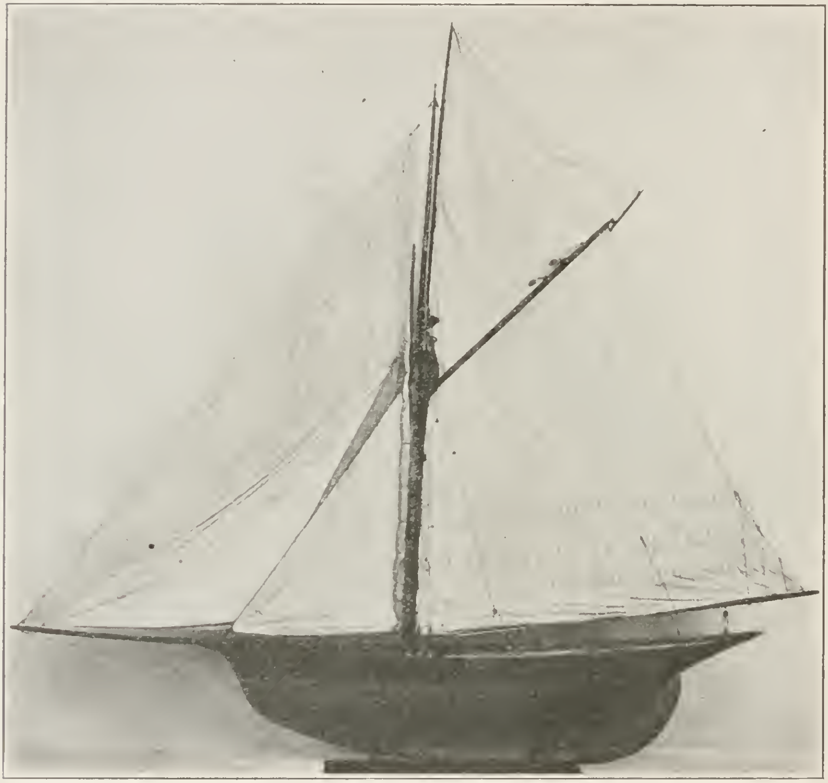


FIG. 23.—YACHT, ENGLISH TYPE.

Gift of Capt. G. M. McLain. Cat. No. 76,151 U.S.N.M.

PLEASURE BOATS.

Model of Whitehall boat.

A type of rowboat extensively used in the United States for pleasure and other purposes. It is claimed that this style of boat was first built at Whitehall, N. Y., hence the typical name.

An open, carvel-built, keel boat with long, sharp, hollow bow; stem straight and nearly vertical above water, curved below: rather low floor; round easy bilge: long, finely-shaped run; light, heart-shaped square stern; rudder outside and worked by wooden yoke; graceful sheer; four thwarts, with stern seats and backboard; grating platform forward of bow thwart; rows four oars.

Dimensions of boat.—Length 18 feet; beam, 4 feet 9¾ inches; depth, top of ceiling to top of gunwale, 19 inches; oars, 11 feet 6 inches. Scale of model, 2 inches equal 1 foot.

The relative proportions of this type vary a great deal: boats of 10 or 12 feet in length are relatively much wider, while those built for speed have less beam and finer ends. This represents the style most commonly used.

Gift of Nash & Sons. Cat. No. 25,001 U.S.N.M.

Model of Adirondack boat.

An open, clinker-built, double-scull wherry of very light construction, with sharp ends; round bottom; light deck at each end.

Dimensions of boat.—Length, 22 feet; beam 3 feet 10 inches; height, amidships, 12 inches. Scale of model, 1½ inches equals 1 foot.

Used for angling and hunting in the Adirondack Mountains.

Gift of Cornwall & Weston. Cat. No. 25,053 U.S.N.M.

Model of New Jersey sneak box.

This type of boat is used chiefly for hunting ducks in the shallow waters along the New Jersey coast. It is from 12 to 15 feet long. The shelving, or sideboards, on the stern of the boat are used to hold the decoys while the hunter rows to and from the shooting ground.

Ducking punt; single spritsail; centerboard; adjustable cover for cockpit and washboard; canvas screen forward.

Dimensions of boat.—Length, 15 feet 6 inches; beam, 5 feet; height, 15 inches; mast, above deck, 7 feet 6 inches. Scale of model, 1 inch equals 1 foot.

Gift of J. D. Gifford. Cat. No. 26,623 U.S.N.M.

Model of Ausable boat.

An open, sharp-ended, flat-bottomed skiff. Made of white pine; bottom nearly straight for 8 feet in center; sheer of 5 inches at bow, 7 inches at stern; well, 6 feet from bow, extends 2 feet; will carry two men, 200 pounds baggage steadily; setting pole used exclusively.

Dimensions of skiff.—Length, 18 feet 6 inches; beam, 3 feet 6 inches; depth, 13½ inches. Scale, 2 inches equal 1 foot.

Used for trout and grayling fishing in rapid streams. Very light and easy to carry.

Gift of D. A. Fitzhugh, jr. Cat. No. 25,899 U.S.N.M.

Model of Egg Harbor melon seed.

A wooden, carvel-built, wide and shallow centerboard boat, with moderately sharp bow; square stern; decked, with exception of cockpit amidships, for which there is an adjustable covering; carries a single sprit sail.

Dimensions of boat.—Length, 13 feet 4½ inches; beam, 4 feet 3 inches; height, amidships, 13½ inches; mast, above deck, 4½ feet. Scale, 2 inches equal 1 foot.

Boats of this type are used for hunting sea fowl in the shallow waters of the marshes and bays bordering the New Jersey coast. The typical name of "melon seed" is derived from the shape of the boat.

Gift of P. Brasher. Cat. No. 25,658 U.S.N.M.

Model of cruising canoe.

A wooden clinker-built, sharp-ended canoe; decked, with exception of small oval-shaped cockpit amidships; long sharp bow; stem nearly vertical in upper section, strongly curved and raking below; rather low floor; easy bilge; long sharp stern; straight raking sternpost; rudder worked by lines attached to yoke and leading to a tiller-yoke forward of mainmast. Very short masts with lateen sails, having boom on foot; has one double-bladed paddle.

Dimensions of canoe.—Length, 18 feet 10½ inches; depth, 17 inches; foremast, above deck, 6 feet 1½ inches; foreyard, 14 feet 7½ inches; boom, 12 feet; mainmast, above deck, 3 feet 4½ inches; mainyard, 7 feet 8 inches; boom, 6 feet 9 inches; paddle, 9 feet 3 inches. Scale of model, 2 inches equal 1 foot.

Used for cruising in the interior waters of the United States. Canoes of this type often engage in races. This model is a miniature of the canoe *Capitol*, built by Mr. Passeno at Washington, D. C.

Gift of J. Passeno. Cat. No. 76,083 U.S.N.M.

The "Sairy Gamp" canoe.

A small canoe which became famous because of the long voyage made in her through the interior waters of the United States.

An open, double-ended, clinker built, keel canoe, with moderately raking stem and sternpost; sharp bow and stern, very shallow keel; flat floor; round bilge; flaring sides; moderate sheer; two gunwale braces; one small paddle; one double-bladed paddle. Built of wood over very light frame.

Dimensions of canoe.—Length over all, 9 feet; beam, 26 inches; depth, 6¾ inches; small paddle, 17 inches long, blade 3 inches wide; double (jointed) paddle, 6 feet 1 inch.

Cat. No. 160,315 U.S.N.M.

FISHING VESSELS.

STEAMERS.

Model of whaling steamer.

The bark-rigged auxiliary screw steamer *Orca*, of which this is a miniature, was built at San Francisco, Cal., in 1882 for employment in the whale fishery of the Pacific and Arctic oceans.

A wooden, carvel-built, keel vessel; with moderately sharp bow; raking stem; long head; rather low floor; full midship section; fine run and overhanging round stern; provided with a two-bladed propeller so that it can be turned on a line with the sternpost and rudder. Model fitted with deck house; steam windlass for handling anchors and for hoisting in blubber, etc.; pilot house on forward end of poop, and wheelhouse at the stern; cabin house flush with quarter rail; open rail around it; two boats on forward house.

Dimensions of vessel.—Length between perpendiculars, 177 feet; beam, 32 feet 6 inches; depth, 18 feet 11 inches; net tonnage, 462.39. Bowsprit, outside, 28 feet; foremast, above deck, 51 feet; foretopmast, 40 feet; fore-topgallant and royal masts, 42 feet; foreyard, 59 feet 9 inches; lower fore-topsail yard, 51 feet 6 inches; upper fore-topsail yard. 49 feet 9 inches; fore-topgallant yard, 40 feet; foreroyal yard, 31 feet; mainmast, above deck, 52 feet 3 inches; main topmast, 40 feet; main topgallant and royal masts, 42 feet; main yard, 62 feet; lower main topsail yard, 51 feet 9 inches; upper main topsail yard, 50 feet 6 inches; main topgallant yard, 41 feet; main royal yard, 31 feet 6 inches; mizzenmast. above deck, 47 feet; mizzen topmast, 48 feet 9 inches; spanker boom, 38 feet; spanker gaff, 27 feet; smokestack above deck, 16 feet 6 inches. Nominal horsepower, 280. Scale of moled, one-half inch equals 1 foot.

The *Orca* was the largest vessel of her class in the United States. She was sheathed from the bilge to above the waterline with an extra thickness of heavy planking, and covered around the stem with thick metal and was otherwise specially fitted and strengthened for encountering the ice floes which were met with when hunting whales in Bering Sea and the Arctic Ocean. She carried seven boats on her cranes and was called a "7-boat ship." She had a full bark rig and cruised under sail when steam was not required. She was fitted with a steam digester for drying out oil.

She was one of a number of bark-rigged whaling steamers built in the latter part of the nineteenth century with special reference to the pursuit of whales among the ice floes of Bering Sea and the

Arctic Ocean north of Bering Straight. In later years some of these vessels wintered off the mouth of the Mackenzie River and made enormous catches in the following summer. Among them the *Orca* was one of the most successful.

The *Orca* was one of the fleet of whaling ships ripped in the ice off Point Barrow in the fall of 1897. The crews of these vessels were exposed to such extreme peril from starvation that a Government expedition was sent to their relief in the winter of 1897–1898. Deposited by United States Fish Commission.

Cat. No. 76,237 U.S.N.M.

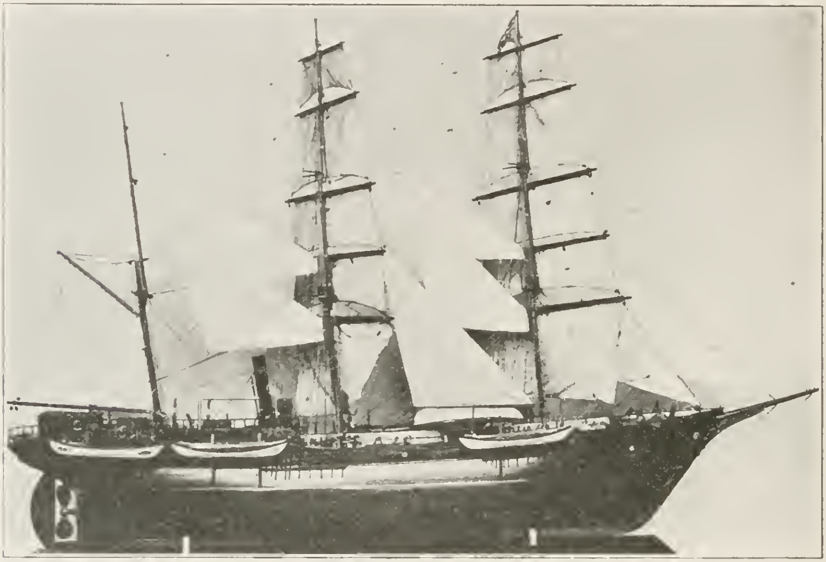


FIG. 24.—WHALING STEAMER "ORCA."

Model of fishing steamer.

The screw steamer, *Golden Gate*, of which this model is a miniature, was built in 1891 for employment in the market fishery from San Francisco, Calif. It represents a type of small sloop-rigged steamers of which several have been built since 1889 to fish from San Francisco with the parenzella—a large net which is towed over the bottom for the capture of ground fish. The building of such vessels for the market fisheries of the Pacific coast was suggested by Capt. J. W. Collins, in a paper published in 1888, entitled Suggestions for the Employment of Improved Types of Vessels in the Market Fisheries, etc.

A wooden, carvel-built, keel vessel, with sharp bow; straight stem above water line; curved below; moderate rise to floor; long, lean run; round stern; strong sheer; engine and pilot houses on deck;

sloop rigged, with loose footed gaff mainsail, and jib set on stay going to stem head. Single screw propeller.

Dimensions of vessel.—Length over all, 80 feet; beam, 18 feet; depth, 7 feet; mast, deck to truck, 60 feet; gaff, 20 feet; mainsail: on foot, 62 feet; luff, 36 feet; head, 18 feet 6 inches; leach, 59 feet: jib: luff, 47 feet; leach, 45 feet; foot, 15 feet. Scale of model, one-half inch equals 1 foot. Cat. No. 76,240 U.S.N.M.

Model of steam schooner.

The steam schooner *Royal*, of which this model is a miniature, was built at Benecia, Calif., in 1891. She was one of the fleet of small auxiliary steam schooners employed in the Alaskan salmon fishery, chiefly in transporting fresh salmon from the fishing grounds to the canneries. The pole masts and leg-of-mutton mainsail are characteristic features of schooners fishing in Alaskan waters.

The *Royal* is a wooden, carvel-built, screw steamer, with sharp bow; curved raking stem; rising floor; fine run; overhanging, elliptical stern; good sheer; two-bladed screw propeller; fitted with deck houses, companionways to cabin forecastle, etc.; quarter-deck flush with main rail and about one-third the vessel's length; open rail around the quarter, made of wire rope passing through iron stanchions; boat hung to davits amidships on starboard side.

Dimensions of vessel.—Length over all, 81 feet; beam, 20.6 feet; depth, 8.2 feet; net tonnage, 29.54; mainmast, deck or truck, 56 feet; foremast, deck or truck, 56 feet; bowsprit, outboard, 13 feet; main boom, 44 feet; foregaff, 16 feet. Scale of model, one-half inch equals 1 foot.

Deposited by the Bureau of Fisheries. Cat. No. 76,238 U.S.N.M.

Model of fishing steamer.

The oyster steamer *Jeremiah Swift*, of New Haven, Conn., was built in 1885 at West Haven, Conn. She is one of the largest and finest vessels of this class; constructed for the special purpose of prosecuting the oyster fishery and the cultivation of oysters in Long Island Sound, in which industry quite a large fleet of steamers is engaged.

This vessel is wide and rather flat, with moderately sharp bow and low, rounding bilge; rather short run; large deck houses; iron rollers and reels for operating dredges; chafing chocks on sides, etc. The vessel is a single-screw propeller, and will steam about 7 or 8 knots.

Dimensions of vessel.—Gross tonnage, 113.38; net tonnage, 66.68. Length over all, 72 feet; extreme beam, 24 feet; draft, 6 feet. Scale of model, one-half inch equals 1 foot.

Deposited by the Bureau of Fisheries. Cat. No. 76,239 U.S.N.M.

Model of fishing steamer.

The paddle-wheel steamer *Camille*, of which this model is a miniature, was employed in Croatan Sound, N. C., for laying out the immense drag seines used in that region, and for transporting fish to shipping points. She was one of the best types of fishing steamers used in the waters of North Carolina. She was built at Manteo in 1885, and owned at Edenton, N. C.

This vessel, like all of her class, was designed for the lightest possible draft, since it is necessary in taking on board the seines from the beaches to go in very shallow water. She has a sharp bow; flat floor; long, fine run; projecting guards; round stern; fitted with deck house, paddle wheels, etc.

Dimensions of vessel.—Length over all, 53 feet; beam across paddle boxes, 17 feet 6 inches; depth, 5 feet; length of deck house, 24 feet; height of deck house, 7 feet; smokestack above top of house, 14 feet. Scale of model, one-half inch equals 1 foot.

Deposited by the Bureau of Fisheries. Cat. No. 76,236 U.S.N.M.

Model of fishing steamer.

A screw propeller steamer employed in the menhaden purse seine fishery, for which she was specially designed by the late D. J. Lawlor. She has a single-screw propeller; sharp bow; low, flat floor; shallow keel; lean run; round stern and moderate sheer. She is sloop-rigged, carrying mainsail and jib (the jib is triced up on the stay, mainsail brailed up to gaff and mast). Pilot house and captain's cabin on deck forward; large main hatch amidships; enginehouse, etc., aft. Carries two seine boats at quarter davits.

Dimensions of vessel.—Length over all, 110 feet; beam, 17 feet; depth, 7½ feet; draft of water, bow 3 feet, aft 7½ feet; mast above deck, 54 feet; gaff, 21 feet; mast, 38 feet aft of stem. Scale of model, one-half inch equals 1 foot.

The *Jemima Boomer*, of Tiverton, R. I., is a vessel well adapted to the prosecution of the menhaden purse seine fishery. She has large cargo capacity, and it is claimed that she will make a speed of 9 to 10 knots, even when deeply loaded. A fleet of steamers is engaged in this fishery and their catches for the season have varied from 10,000 to upwards of 90,000 barrels of fish. Fishing is carried on near the land and usually in comparatively smooth water.

Cat. No. 76,012 U.S.N.M

Model of lake gill-net steamer.

This represents the type of small steamers employed in the gill-net fisheries of the Great Lakes. They vary in size from 10 to 40 tons. The nets are set over the stern and are drawn in over a wooden roller on the bow. The fish are stowed in bins or ice boxes in forward hold.

Single-screw propeller; one mast fitted with stationary gaff for hoisting cargo or for sail; sharp bow and floor; easy run; round stern; engine and wheel houses on deck.

Dimensions of vessel.—Length over all, 61 feet; beam, 11½ feet; smokestack, 12 feet above rail; diameter of screw, 4½ feet; length of mast, 34 feet; gaff, 15½ feet. Scale of model, one-half inch equals 1 foot.
Cat. No. 55,812 U.S.N.M.

Block model of fishing steamer.

From this model the schooner-rigged screw steamer *Novelty* was built at Kennebunkport, Me., in 1885 from designs by Capt. H. B. Joyce. She was specially designed for the mackerel purse seine fishery, and at first carried a "double gang" crew of about 40 men, and was equipped with four seine boats and two purse seines, both of which could be operated at the same time.

The vessel was a single-screw propeller; she was carvel-built of wood—chiefly of oak and yellow pine—with long sharp bow; stem straight and nearly vertical above water, curved below; moderately sharp floor; shallow keel; long, easy run; round stern and good sheer. On the after section of the deck were deck houses over the boilers and engines. She was rigged as a two-masted schooner without a bowsprit, the jib stay setting up at the stem head. The mainmast was placed well aft. She was fitted to carry a beam and gaff mainsail, a loose-footed gaff foresail, and jib.

The *Novelty* was employed in the summer mackerel fishery until November, 1889. In December, 1889, she was purchased by agents of Hippolyte, of the revolutionary party, at Santo Domingo, West Indies, and her name changed to *Jacmel*. She was used as a gunboat very effectively during the revolution, and was the principal factor in securing the success of the revolutionists, her superior speed requiring the constant exertions of the Haitian Navy of Legitime to protect Port au Prince and other places from her attacks, and leaving the northern ports of the revolutionists free from blockade.

After the termination of the struggle she was thoroughly overhauled and refitted at Philadelphia, and soon after returning to Haiti, was sunk in collision with one of the captured fleet of Legitime (the *Dessalines*) in 1891.

Gift of Capt. H. B. Joyce. Cat. No. 76,286 U.S.N.M.

Model of seine steamer.

This vessel was built at Essex, Mass., and was the first steam fishing vessel built in the United States for the Grand Banks fishery. It resembles a modern ocean-going tug, but is without guards, and was especially equipped for mackerel seine fishing in which employment she was very successful.

The *Alice M. Jacobs* is a wooden, carvel-built, screw steamer with sharp bow; curved slightly raking stem; rising floor; fine run; overhanging elliptical stern; good sheer; two-bladed propeller. Deck house forward and funnel aft; boat hung from davits amidship on port side. Rigged as a schooner with mainsail, foresail, and fore staysail.

Dimensions of vessel.—Length, 142 feet; beam, 24 feet; depth, 14 feet; mainmast, 88 feet; foremast, 82 feet; main boom, 48 feet; main gaff, 24 feet; foregaff, 24 feet; speed of vessel, 10 knots an hour. Scale of model, two inches equals 1 foot.

Gift of Capt. H. B. Joyce. Cat. No. 285,032 U.S.N.M.

Block model of steam seine boat.

This model was designed by Past Assistant Engineer George W. Baird, United States Navy, for a small, shallow draft, side-wheel steamer to be used in operating a drag seine for the United States Bureau of Fisheries at Havre de Grace, Md., or elsewhere. The steamer was not built.

Dimensions of proposed vessel.—Length between perpendiculars, 66 feet; beam, 12 feet 6 inches; displacement, 20¾ tons. Two independent cylinder engines, 10 by 24 inches, indicated horsepower, 62. Diameter of wheels, 9 feet. Herreshoff patent boiler, size J. Scale of model, one-half an inch equals 1 foot.

Cat. No. 76,022 U.S.N.M.

Block model of welled steam launch.

This model was designed by J. W. Waters for a screw steamer launch for the United States Bureau of Fisheries, the launch to have a well for keeping fish alive. It was intended that the well should be placed forward. No launch was built.

The vessel was to be a wooden, carvel-built, single screw steam launch, with three open spaces covered with hoods; long sharp bow; raking convexly curved stem; rising floor; long easy run; overhanging round stern; balance rudder; medium sheer.

Dimensions of launch.—Length over all, 38 feet 6 inches; beam, 9 feet 3 inches; depth, 3 feet 6 inches. Scale of model, 1 inch equals 1 foot.

Gift of J. W. Waters. Cat. No. 160,103 U.S.N.M.

SAILING VESSELS.

Model of seventeenth century snow.

This represents a type of vessel called a "snow," which was extensively employed in the codfishery on the Banks of Newfoundland, in the earliest days of that industry, and for nearly two hundred years subsequently. The rig, from which the specific name was derived, is now known as a square-rigged brig. This model also illustrates the method of hand-line codfishing pursued in early colonial days.

The model represents a wooden, carvel-built, keel vessel, with full, long body; round bow; large figure head, and heavy windlass abaft the foremast: boat stowed amidships; square stern; steers with a tiller.

Rigged as a snow of the seventeenth century.

Dimensions of vessel.—Length over all, 72 feet; beam, 18 feet; depth, 10 feet; bowsprit, outside, 29 feet 6 inches; spritsail yard, 33 feet; foremast, above deck, 41 feet; fore-topmast, heel to head, 37 feet; fore flagpole, 16 feet 6 inches; foreyard, 40 feet; fore-topsail yard, 33 feet; mainmast, above deck, 42 feet; main topmast, heel to truck, 38 feet; main flagpole, 17 feet 3 inches; mainyard, 41 feet; main topsail yard, 34 feet 6 inches; spanker gaff, 21 feet 6 inches. Scale of model, one-half inch equals 1 foot.

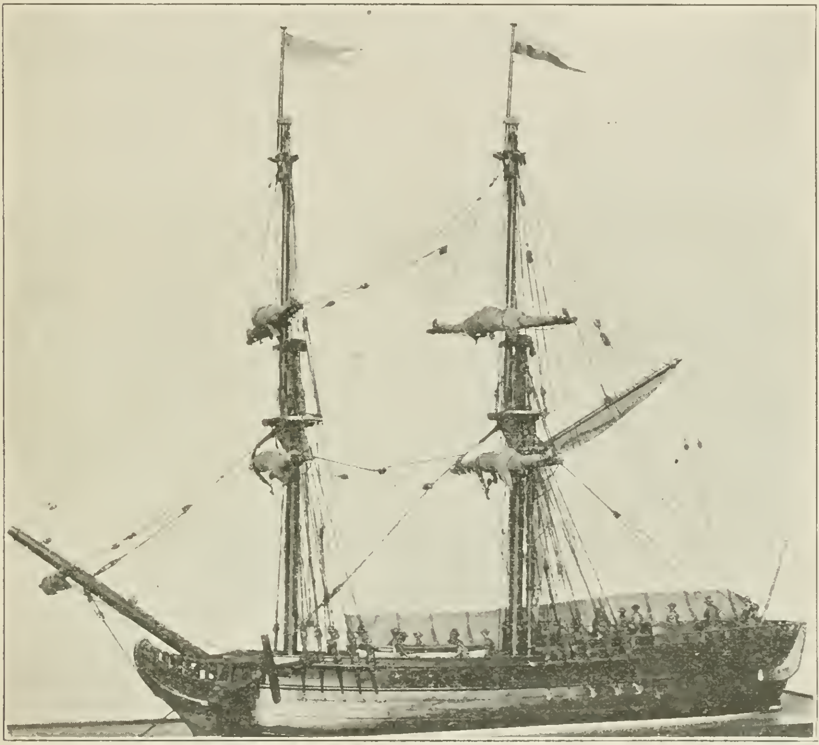


FIG. 25.—SEVENTEENTH CENTURY "SNOW."

The snow is represented as riding at anchor on a fishing bank with all sails furled. Along the starboard side are 10 men standing in barrels lashed to the deck, fishing for cod with hand lines over the side of the vessel. The latter is supposed to be swung by the current side to the wind; and along the weather side of the vessel, upon which the fishermen stand, is stretched a canvas wind break to protect the men from the cold breeze. The barrels were used to keep the fishermen dry, as oil clothing had not been invented. A man is tossing the fish as fast as they are caught over to the port side, where two men are busily engaged in dressing the catch. The split fish are dropped into a sluice that conducts them to the salter in the hold of the vessel.

Deposited by the Bureau of Fisheries. Cat. No. 76,250 U.S.N.M.

Model of seventeenth century fishing vessel.

This model represents a type of small vessels employed in the fisheries of the western Atlantic in early colonial times. The hull has been made after the lines of the *Sparrow Hawk* that was wrecked on Cape Cod in 1626, the remains of which were uncovered in 1863.

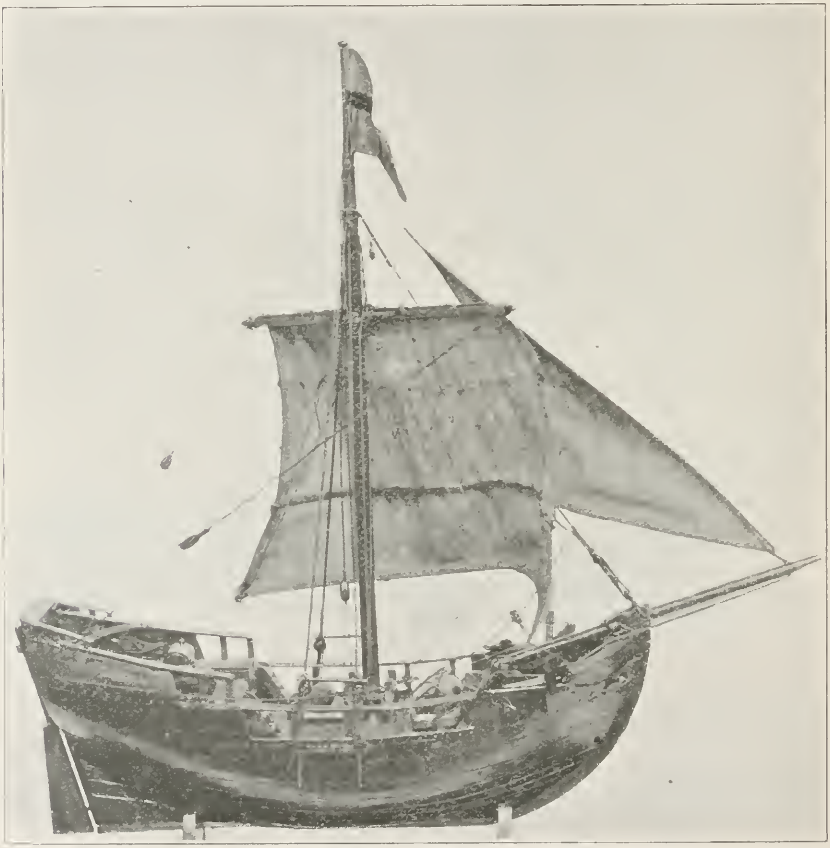


FIG. 26.—EARLY SEVENTEENTH CENTURY SAILING VESSEL.

Carvel-built, keel vessel, with moderately full, convex bow; strongly raking, curved stem; round, full bilge; short run; heavy square stern, with no overhang to counter; rudder hung outside; strong sheer; high quarter-deck; rail open amidships. The rig consisted of a single mast, upon which was carried one square sail and jib.

Dimensions of vessel.—Length over all, 40 feet; beam, 14 feet 9 inches; molded depth, 7 feet; mast, above deck, 45 feet; yard, 32 feet; bowsprit, outside of stem, 12 feet. Scale, one-half inch equals 1 foot.

A comparison of this little vessel with those used in the Atlantic fisheries at the present time will be interesting.

Deposited by the Bureau of Fisheries. Cat. No. 76,269 U.S.N.M.

Block model of whaling ship.

The clipper whale ship *Onward*, of New Bedford, was built from this model at Mattapoisett, Mass., in 1854. She was specially designed for the whale fishery and was one of the finest vessels engaged in that industry at the date of her construction. She was rigged as a ship at first, but after some years was transformed into a bark.

The *Onward* was a wooden, carvel-built, keel sailing bark, with sharp bow, flaring at top; raking stem; long head, with gilded scroll work; sharp floor, easy turn to bilge; long, finely shaped run; plumb sternpost; heavy square stern, ornamented with gilded scroll work; moderate sheer.

Dimensions of vessel.—Length over all, 133 feet; beam, 26 feet 6 inches; depth of hold, 14 feet; 339 tons. Scale, one-half inch equals 1 foot.

The *Onward* sailed on her last voyage June 25, 1872. In 1876 she was one of the fleet of whalers caught in the ice pack in the Arctic Ocean north of Bering Strait and was abandoned. She had previously sent home 645 barrels of sperm oil, 856 barrels of whale oil, and 47,200 pounds of whalebone; and at the time she was nipped she had on board 1,400 barrels of whale oil and 14,000 pounds of bone.

On April 10, 1866, the *Onward* arrived home, having made a "great voyage," on which she took, in all, 180 barrels of sperm oil, 5,650 barrels of whale oil, and 62,100 pounds of bone. On the previous voyage she was equally successful, and may be called a "lucky ship."

Gift of New Bedford Board of Trade. Cat. No. 160,125 U.S.N.M.

Block model of whaling bark.

The *Nautilus* was a carvel-built, wooden, keel vessel of the clipper type, designed for an "easy cutting-in ship." Bow sharp; rising, rounding floor; long, lean run; square stern; moderate sheer.

Dimensions of vessels.—Length over all, 114 feet; beam, 27 feet 5½ inches; molded depth, 16 feet; tonnage, 277.17. Scale, one-half inch equals 1 foot.

This model represents the highest attainment of naval architects in producing clipper ships for the American whale fishery at the date when the *Nautilus* was built. Her capacity was 2,400 barrels, of 31½ gallons each.

"She was a successful vessel. After completing her seventh voyage in the year 1881, she was sold to Talcahanna parties who kept her in the whaling business from that port until 1890."

Gift of Gideon Allen. Cat. No. 76,324 U.S.N.M.

Block model of whaling bark.

The bark *Reindeer*, of New Bedford, Mass., was built from this model at that port in 1857, for the special purpose of engaging in the whale fishery. In this industry it is important to have an "easy cutting-in ship," one that is not too wide and flat on the floor, so that she will not pull too hard at the "cutting-in tackles" when a whale is being stripped of its blubber in a seaway. Speed is also an important requisite.

The *Reindeer* was a wooden, carvel-built, keel clipper bark; sharp bow, flaring and rather full at rail; raking stem; long head with gilded scroll on trail boards; rather sharp floor, with easy turn to bilge; long, finely shaped run; straight, vertical sternpost; heavy square stern, ornamented with gilt scroll work; very slight sheer.

Dimensions of vessel.—Length over all, 130 feet; between perpendiculars, 119 feet 8½ inches; beam, 26 feet 6 inches; depth of hold, 17 feet 6 inches; gross tonnage, 357.49. Scale of model, one-half inch equals 1 foot.

This vessel was one of the finest and swiftest whaling ships of the period when she was built. Her heavy square stern and comparatively full bow at the rail scarcely suggested the speed that came from the sharp, finely formed underwater section. At first she was rigged as a ship, but after some years' service was transformed into a bark. In 1862 she was attacked by the natives in the Arctic, but the savages were driven off. On February 27, 1864, she arrived home from a very successful voyage, on which she took 123 barrels of sperm oil; 5,493 barrels of whale oil, and 62,600 pounds of whale bone.

Gift of New Bedford Board of Trade. Cat. No. 160,124 U.S.N.M.

Block model of whaling bark.

The clipper sailing bark, *Jireh Swift*, was built from this model at Dartmouth, Mass., in 1853 to engage in the whale fishery from Fairhaven, Mass. She is a representative of the best class of whale ships of that period. She was first rigged as a ship, but in 1857, after returning from her first voyage, was purchased at New Bedford and rigged as a bark.

The *Jireh Swift* was a wooden, carvel-built, keel vessel; bow sharp; rising floor; easy round bilge; long, lean run; square stern; moderate sheer.

Dimensions of vessel.—Length over all, 126 feet; molded beam, 27 feet; molded depth, 18 feet; capacity, 454 tons. Scale, one-half inch equals 1 foot.

The special object sought in the construction of whaling vessels is speed, and at the same time to make them not too flat and stiff, it being desirable to have an "easy cutting-in ship"—one that will respond satisfactorily to the strain of the masthead tackles when a whale is being stripped of its blubber in a seaway.

On her third voyage, June 22, 1865, the *Jireh Swift*, while whaling in the Arctic Ocean near Bering Strait, was captured and burned by the Confederate cruiser *Shenandoah*. Her agents, Swift & Allen, stated that "she came near outsailing the steamer, and had the wind continued through the race as at the start she would have kept clear of the steamer."

Gift of Swift & Allen. Cat. No. 76,323 U.S.N.M.

Block model of whaling ship.

The ship *Cornelius Howland*, of New Bedford, was built from this model in 1859. She was specially designed for the whale fishery, in which she was employed for many years.

A wooden, carvel-built, keel ship; bow moderately full above water, sharp at and below water line; raking, convexly curved stem; long head; sharp floor; long, lean run; plumb sternpost; heavy square stern; medium sheer.

Dimensions of vessel.—Length over all, 128 feet; beam, 27 feet; depth, 14 feet; 333 tons. Scale of model, one-half inch equals 1 foot.

The *Cornelius Howland* sailed on her last voyage August 4, 1874. She was nipped in the ice pack of the Arctic Ocean north of Bering Strait in 1876 and was abandoned. She had previously sent home 600 barrels of sperm oil, 1,220 barrels of whale oil, and 10,000 pounds of bone, and when caught by the ice she had on board 1,400 barrels of whale oil and 8,000 pounds of bone.

Gift of New Bedford Board of Trade. Cat. No. 160,126 U.S.N.M.

Model of ketch.

This is a type of vessel employed in the American fisheries in early colonial times, and prior to the invention of the schooner, of which the first was built at Gloucester, Mass., in 1713.

It had a full, bluff bow; curved stem, with projecting billethead; low, full bilge; short, full run; full rounding stern, having a projection above deck, extending aft of rudder head like the "pink" of the pinky; curved sternpost; slight sheer. The rig consists of two masts and an adjustable bowsprit. The mainmast is placed in the center of the vessel and the mizzen half way between the mainmast and stern sail, topgallant sail, and spencer on mainmast, and topsail and spanker on mizzenmast.

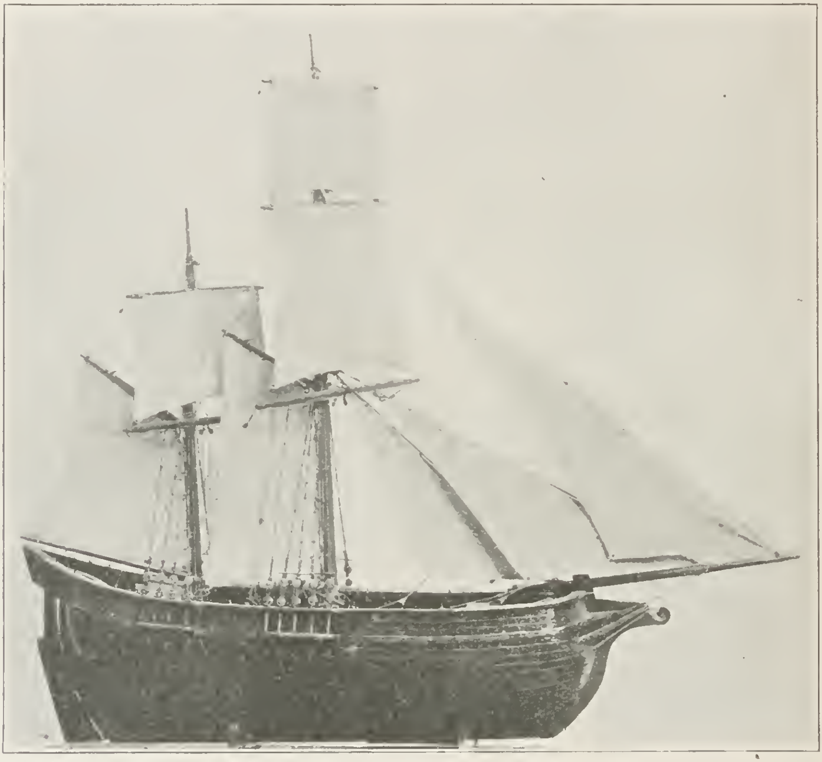


FIG. 27.—AMERICAN FISHING KETCH.

Dimensions of vessel.—Length over all, 55 feet; beam, 15 feet; extreme draft, 8 feet; bowsprit, outboard, 20 feet; mainmast, above deck, 30 feet; main topmast, 19 feet 6 inches; main topgallant mast, 14 feet; mizzenmast, above deck, 24 feet; mizzen topmast, 18 feet; spanker boom, 16 feet; gaff, 12 feet. Scale of model, one-half inch equals 1 foot.

This type of vessel was first invented and used for a bomb ketch, and the mainmast was stepped far aft to leave room on deck for operating one or more mortars. Subsequently the rig came into favor for yachts and fishing vessels as well as for the merchant marine. Even at a recent date it has been used in Holland.

"In the early days of navigation these masts carried lateen sails, but in the last (eighteenth) century the larger mast had the sails of the foremast of a ship and the smaller was rigged like the mizzenmast of a bark of the present day. This vessel seems to have been a favorite with our New England ancestors. One of only 16 tons burden cleared from Boston for Virginia in 1661. In 1670 the shipping of a distinguished Boston merchant consisted almost entirely of vessels of this class." [14]

The model made by Captain Chester is distinctly of Dutch origin. In the early colonial days the influence of Dutch builders was strongly felt in England and America.

Gift of Capt. H. C. Chester. Cat. No. 57,014 U.S.N.M.

Model of old-style fishing schooner.

A type of fishing schooner extensively employed in the Grand Bank codfishery from Marblehead, Mass., during the eighteenth century and to a less extent in the early part of the nineteenth century. Vessels of a similar type were also employed in fishing from Gloucester and Plymouth, Mass.

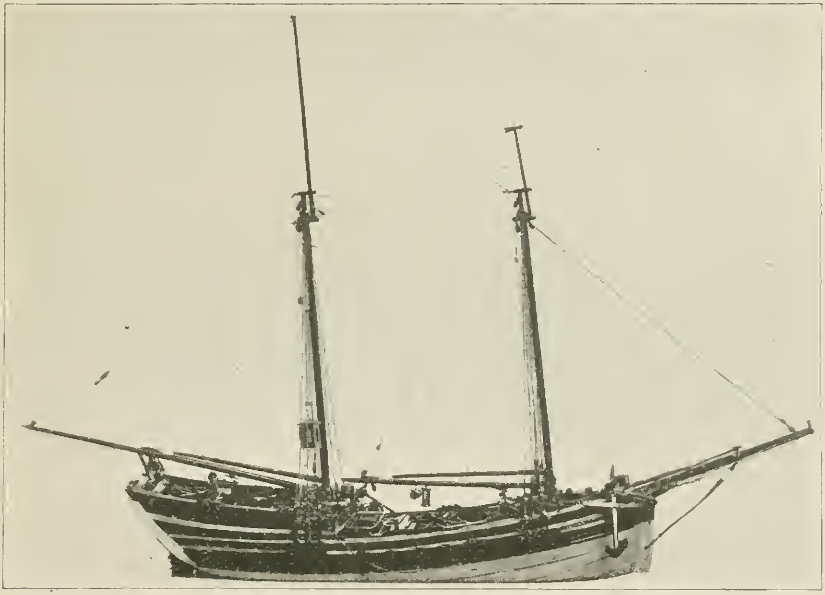


FIG. 23.—SCHOONER, MARBLEHEAD, MASS.

This was a wooden, carvel-built, keel vessel, with full, round bow and curved stem; with gammon knee at top of stem; long straight side; long floor; low, full, round bilge; short, full run; large square stern; high quarter-deck; old-style wooden windlass (worked with hand spikes): hemp cables: anchors: four fish kids on main deck; steps on each side of quarter-deck: two wooden pumps; yawl boat. Rigged as two-masted schooner with long bowsprit and short masts; sails furled.

---

[14] Babson's History of Gloucester.

Dimensions of vessel.—Length over all. 52 feet; on water line, 47 feet; beam. 15 feet: depth of hold. 7 feet 6 inches; bowsprit outside of knightheads. 19 feet: total length. 25 feet: foremast. above deck, 33 feet: mainmast. above deck. 34 feet: main topmast. heel to truck. 22 feet; mainboom. 32 feet; maingaff. 16 feet 6 inches; foreboom, 22 feet; foregaff. 16 feet. Scale of model. one-half inch equals 1 foot.

This model may be taken as fairly typical of the original schooner built by Captain Robinson for the Bank codfishery at Gloucester, Mass., in 1713. Vessels of this class usually ranged from 40 to 80 tons, old measurement (equal to 25 to 55 tons, new measurement). They had high quarter-decks. and, because of this feature, at a later date were known as "heel tapers." Often they had no bulwarks around the main deck, and in rough weather the men were compelled to stand on the quarter-deck to fish. In all cases the crew fished with hand lines from the deck.

Deposited by the Bureau of Fisheries. Cat. No. 76,243 U.S.N.M.

Model of standing-room Chebacco boat.

The class of small sharp stern vessels represented by this model was extensively used by the New England fishermen in the latter part of the eighteenth century and the early part of the nineteenth century. They were often built by the fishermen who sailed them.

The *Lion* was about 10 tons; had a full round bow; narrow beam; sharp stern: three standing rooms in which the men stood to fish; two hatchways; no bowsprit: two masts. the foremast well forward, mainmast near the middle. Two boom and gaff sails.

Dimensions of vessel.—Length over all, 34 feet; beam, 9 feet 6 inches; depth of hold. 4 feet 6 inches; length of foremast (above deck), 23 feet: mainmast. 23½ feet: foreboom, 12 feet: mainboom, 18 feet 6 inches. Scale of model. one-half inch equals 1 foot.

Vessels of this class ranged from 5 to 18 tons, old measurement. The smaller usually had no bulwarks, and were provided with open spaces or standing rooms, in which the men stood while fishing, and the after one of which also served as a cockpit for the steersman. The floors of these standing rooms were only a little above the keelson. In rough weather they were covered with hatches. The largest Chebacco boats were decked and had no standing rooms. A characteristic feature of this type was a high stem generally painted red, around which the eye of the mooring hawser was put to hold the boat to its anchorage. From this, such craft were often called "Ram's-head boats." As a rule, each boat had a large mooring rock through which a spar projected to the surface of the harbor. To the top of the spar was attached a hawser, in the other end of which was a large eye kept afloat by a buoy. The boats fished on inshore grounds and frequently returned to harbor, where, instead of anchoring, the mooring hawser was picked up and put over the stem head.

Gift of Stephen J. Martin. Cat. No. 39,198 U.S.N.M.

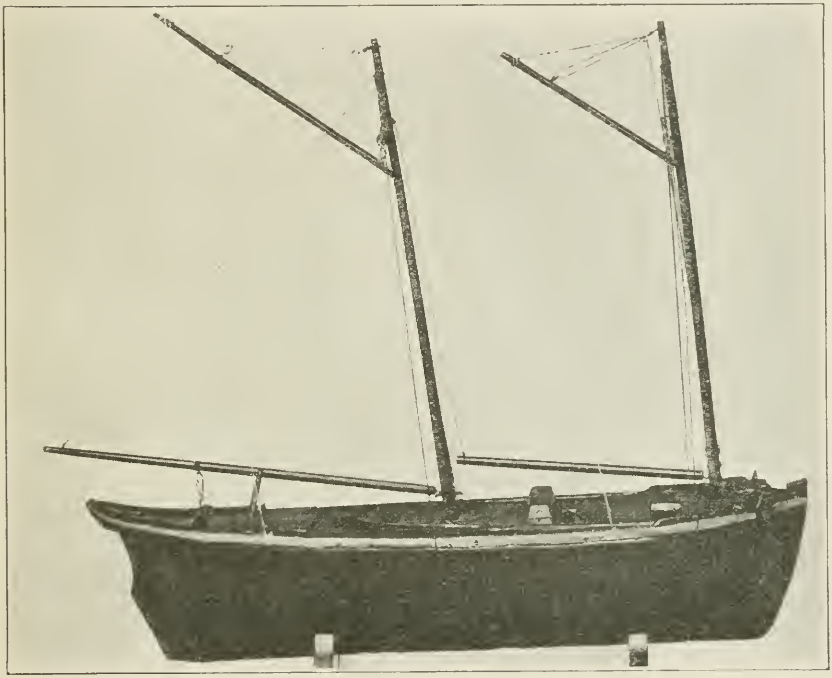


FIG. 29.—CHEBACCO BOAT "LION."

Model of New England pinky.

This is a model of a sharp sterned fishing schooner—with a "pink"—of the type called "pinky," which was extensively built for the New England sea fisheries in the period between 1815 and 1840, and, to a less extent, subsequently.

It has a full rounding bow; stem very much curved; straight side; low round bilge; short full run; sharp stern surmounted by a "pink"; straight slanting sternpost; narrow rudder with square heel; old-style windlass; cables; anchors; raised "cuddy" deck forward; chimney funnel; boat; two fish kids; two masts, bowsprit, topmast; and three sails, mainsail, foresail, and jib.

Dimensions of vessel.—Length between perpendiculars, 45 feet: beam, 14 feet; depth. 6 feet 6 inches; extreme draft, 8 feet 6 inches; bowsprit, outboard, 14 feet; foremast, above deck, 34 feet; foreboom, 19 feet; mainmast, above deck, 38 feet; main topmast, heel to truck, 13 feet 6 inches; main boom, 30 feet. Scale, one-half inch equals 1 foot.

The class of vessels represented by this model succeeded the Chebacco boats, from which they differed only in being, as a rule, larger, and carrying a bowsprit and jib. "Pinkies" were extensively used in the general sea fisheries, being employed on the distant banks and in the waters of the Gulf of St. Lawrence, as well as off the coast of the United States. Few have been built since 1840, and vessels of this class are now rarely seen in the fishing fleet. A few large ones were built in the "forties," some of which carried flying jibs in summer, when engaged in mackerel fishing. Probably no more seaworthy vessels were ever designed; a few of them sailed well for the period in which they were built, and in rough water sometimes outsailed the clipper "sharpshooters" of the early "fifties." They were substantially built of white oak, and some had long terms of service.

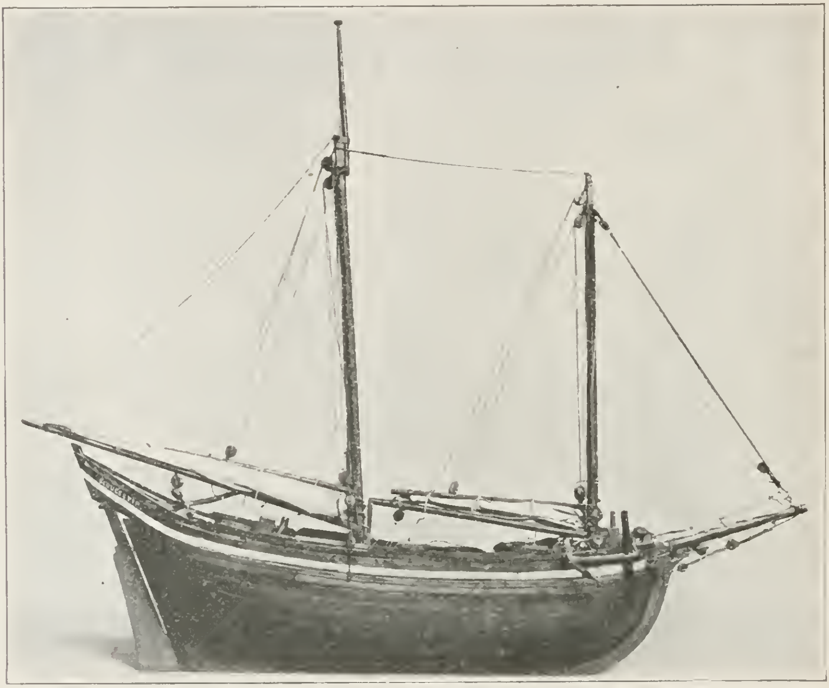


FIG. 30.—NEW ENGLAND FISHING "PINKY."

Deposited by the Bureau of Fisheries. Cat. No. 57,586 U.S.N.M.

Model of old-style fishing schooner.

This class of vessels was extensively employed in the Grand Bank codfishery during the eighteenth century, and, to a less extent, in the early part of the nineteenth century. At the beginning of the War of the Revolution, Marblehead alone had a fleet of more than 170 vessels. Many of them had higher and shorter quarter-decks, and no bulwarks on the main deck. In all cases the crew fished from the deck with handlines.

These vessels had a full round bow, curved stem, and gammon-knee cutwater; long, straight side; long floor; low, full round bilge; short full run; large square stern; high quarter-deck extending nearly to mainmast; old style windlass (worked with handspikes), cables, anchors; four fish kids (two on each side) on main deck; scaffold crutch for foreboom; steps on each side of quarter-deck; two pumps; square stern yawl boat turned bottom up and lashed on top of davits.

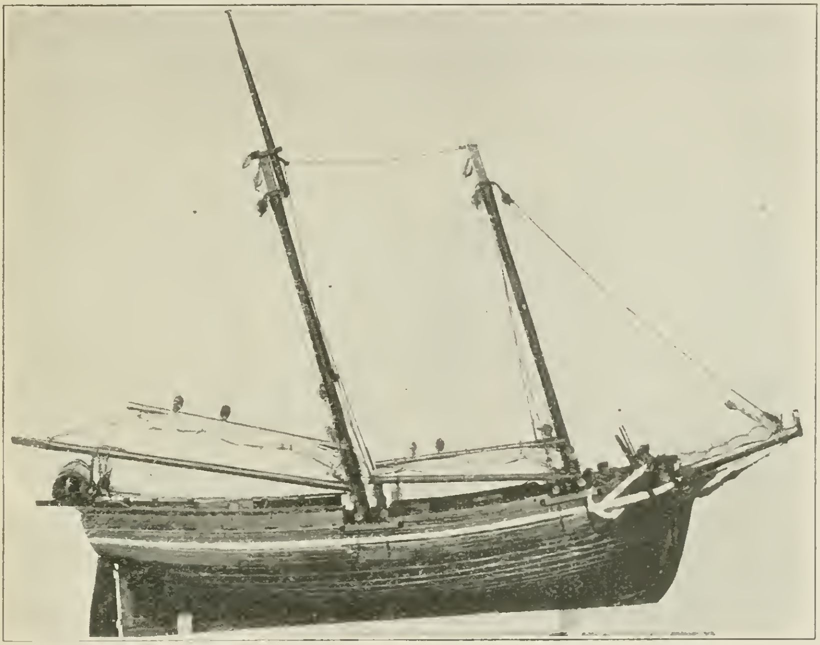


FIG. 31.—GRAND BANKS CODFISHING SCHOONER "OPEN SEA."

Dimensions of vessel.—Length over all, 65 feet; beam, 18 feet; extreme draft, 8 feet; bowspirit, outboard, 15 feet 6 inches; foremast, above deck, 43 feet 6 inches; mainmast, above deck, 45 feet 6 inches; main topmast, 21 feet 6 inches; foreboom, 22 feet; foregaff, 21 feet; main boom, 38 feet; main gaff, 24 feet. Scale of model, one-half inch equals 1 foot.

This is the model of the schooner, *Open Sea*, of Marblehead, built about 1820, and represents a vessel of about 75 or 80 tons, old measurement (55 to 60 tons new measurement): such as were employed in the fisheries in the period between 1750 and 1840. It differs in but a few details from the earliest schooners.

Cat. No. 57,585 U.S.N.M.

Model of square-stern Chebacco boat.

A square stern, decked, Chebacco boat of about 17 tons—a type known as "dogbody" because of its square stern. This, together with "pinky" boats of the same rig, and which were also decked, constituted the best class of Chebacco boats employed in the fisheries during the early part of the nineteenth century.

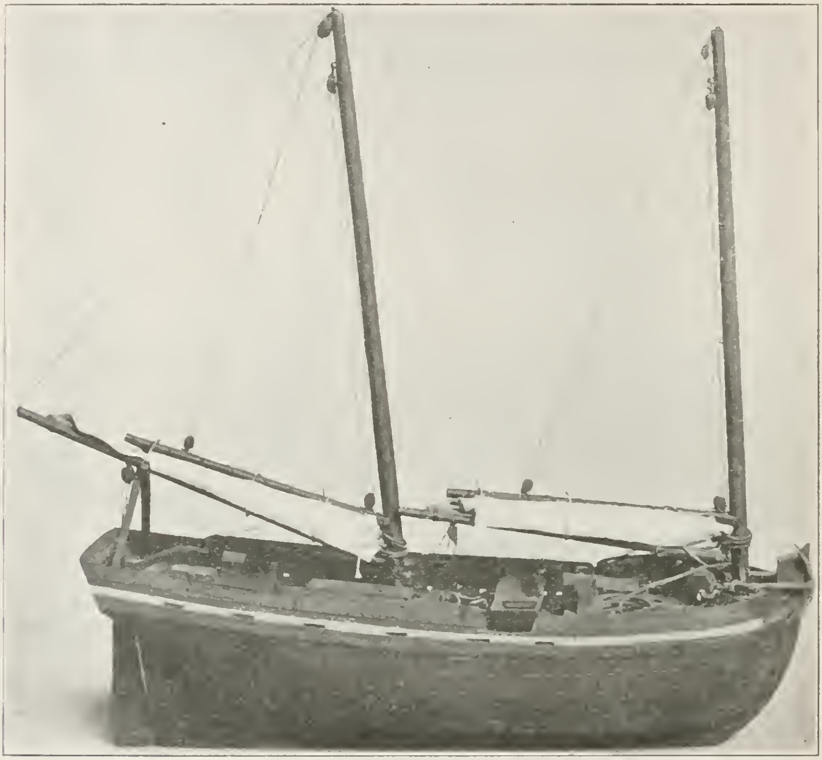


FIG. 32.—DOGBODY CHEBACCO BOAT.

It has very full, rounding bow; straight side; square stern; low, rounding bilge; short run; raised "cuddy deck" forward; high stem; no bowsprit; two masts; two sails—foresail and mainsail—two fish kids; cables; anchor, and fishing rails.

Dimensions of vessel.—Length over all, 36 feet; beam, 11 feet 6 inches; draft, 6 feet; length of spars, foremast (above deck) 28 feet; mainmast (above deck) 30 feet; foreboom 16 feet; foregaff

14 feet, main boom 20 feet, main gaff 13 feet. Scale of model, one-half inch equals 1 foot.

These peculiar fishing vessels, which were extensively used in the shore cod and mackerel fisheries during the eighteenth century and the first three decades of the nineteenth century, derived their specific name of Chebacco boat from the place where they were first built—a part of the present town of Essex, Mass., then known as Chebacco. They had a little cabin or "cuddy" forward, in which were sleeping berths for the men, and a place for cooking. These quarters were usually cramped. They were also dingy from the smoke of the fireplace. During the early part of the nineteenth century, some of these little vessels made voyages to the West Indies, carrying cargoes of fish and bringing home return cargoes of molasses, rum, etc.

Cat. No. 57,587 U.S.N.M.

Model of pinky schooner.

The "pinky" *Tiger*, of which this is a miniature, was built between 1830 and 1840 at Essex, Mass., and for several years was one of the stanchest and most seaworthy vessels employed in the cod and mackerel fisheries from New England. This model was constructed from the lines and sail plan of a pinky, and is typically representative of a peculiar class of New England fishing schooners extensively employed between 1820 and 1850.

Full round bow; curved stem, with gammon knee at top and strong rake below water; long, round floor; rather shallow keel; heavy drag; moderately long, easy run; sharp stern surmounted by a "pink"; strong sheer; flush deck; cabin under deck forward; deck fitted with cabin companionway; hatches; binnacle; fish kids, etc. Boat stowed on deck; schooner rigged, carrying a single topmast and four sails—mainsail, foresail, jib, and main staysail.

Dimensions of vessel.—Length over all, 52 feet; water line, 48 feet; beam, 13 feet 3 inches; depth of hold, 5 feet; bowsprit, outboard, 14 feet; foremast, above deck, 40 feet; foreboom, 17 feet 6 inches; foregaff, 16 feet 6 inches; mainmast, above deck, 42 feet; topmast, 18 feet; main boom, 33 feet; main gaff, 18 feet. Scale, one-half inch equals 1 foot.

The *Tiger*, under the command of Capt. James Patillo, became famous from her connection with incidents of historical interest. On one occasion she was chased by a British war brig in the Bay of Fundy. The sudden lifting of the fog disclosed to the British officers the little pinky not far off and within the limit, where it was claimed, American fisherman had no right to go. All sail was crowded on both vessels. The Englishman fired a gun for the Yankee to heave to; soon the blank cartridge was followed by round shot, one or more of which passed through the schooner's sails. But the undaunted Patillo sent his crew below after the sails were set and trimmed and, lying on his back on deck, he steered the little vessel, which showed a clean pair of heels to her pursuer.

On another occasion the *Tiger* was frozen in while in Fortune Bay, Newfoundland, after a fare of fish in winter. The local authorities determined to capture her, and an armed party, far outnumbering the crew of the pinky, went out near her on the ice. Captain Patillo, though having only a few old muskets, defied them. He was a giant in size, and his appearance and reckless courage intimidated his enemies, who returned crestfallen to their homes.

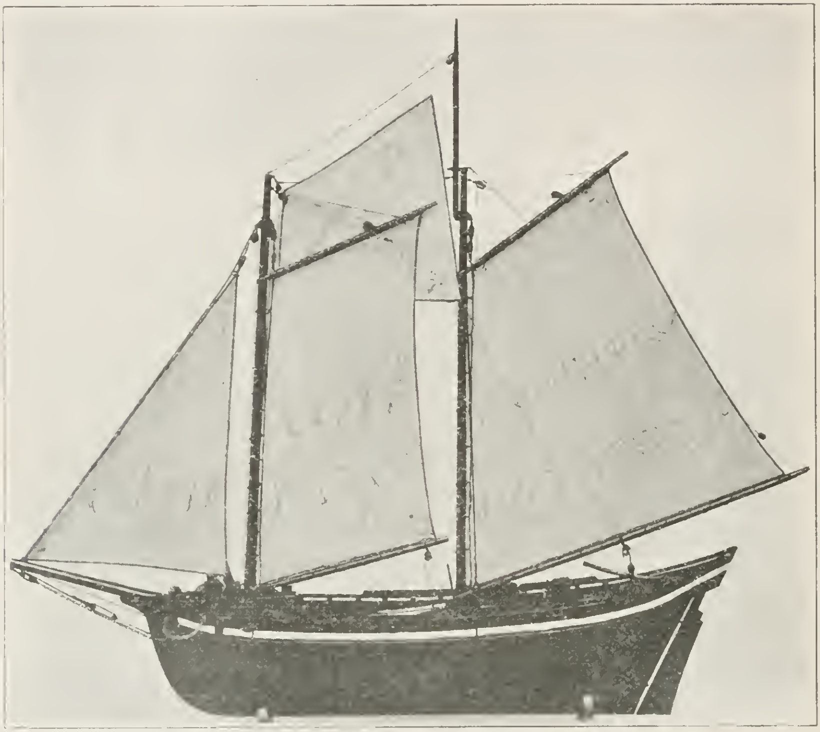


FIG. 33.—NEW ENGLAND PINKY SCHOONER "TIGER."

Deposited by the Bureau of Fisheries. Cat. No. 76,242 U.S.N.M.

Model of old-style schooner.

The fishing schooner *Mt. Vernon* was built at Essex, Mass., about 1840. She is a typical representative of a class of square-stern schooners very generally employed in the cod and mackerel fisheries from New England between 1830 and 1850 and subsequently, though few or none were built after the last-mentioned date.

The vessel had a bluff bow; long, full body; short run; heavy, square stern; moderate sheer; low, short quarter-deck.

Dimensions of vessel.—Length over all, 60 feet 3 inches; beam, 16 feet 6 inches; depth of hold, 6 feet; draft, extreme, 8 feet 6 inches. Scale of model, one-half inch equals 1 foot.

Deposited by Bureau of Fisheries. Cat. No. 76,245 U.S.N.M.

Model of fishing schooner.

The schooner *D. R. Proctor* was built at Lamoine, Me., in 1848, for the purpose of engaging in the codfishery on the coast of Labrador. The vessel is represented as she would appear lying in harbor at Labrador, with sails furled and splitting table and dressing tubs in position on deck. She was a wooden, carvel-built, keel vessel, with full round bow; raking curved stem, short figurehead; rather low long floor; short run; square stern; wooden davits; long low quarter-deck; moderate sheer.

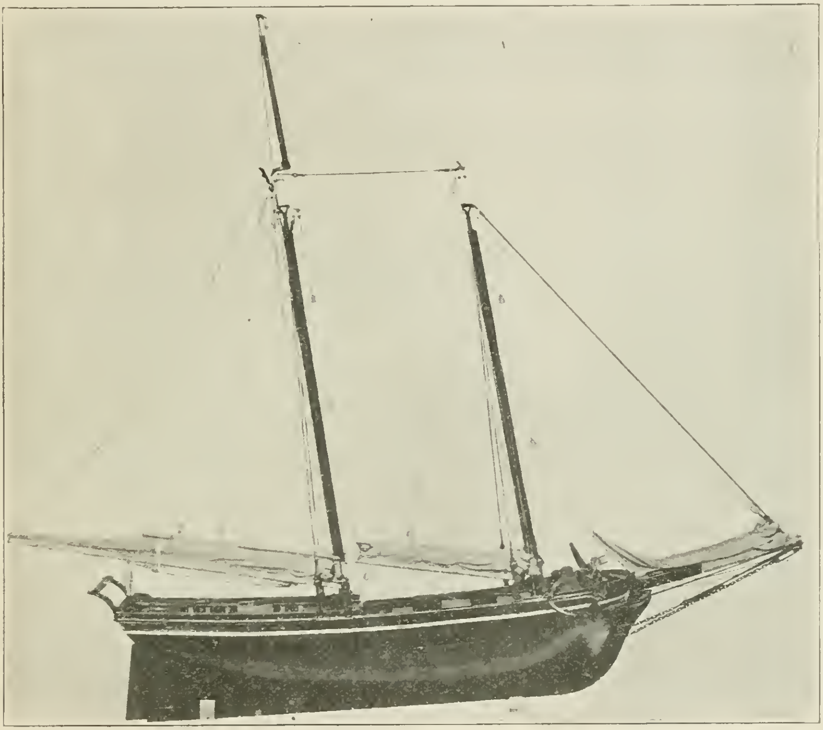


FIG. 34.—NEW ENGLAND SCHOONER "D. R. PROCTOR."

Dimensions of vessel.—Length over all, 58 feet; beam, 16 feet 6 inches; depth, 7 feet; draft, extreme, 9 feet; bowsprit, outside knightheads, 20 feet; foremast, above deck, 50 feet 6 inches; foreboom, 19 feet 6 inches; foregaff, 19 feet; mainmast, above deck, 51 feet; main topmast, heel to truck, 26 feet; main boom, 38 feet; main gaff, 21 feet 6 inches. Scale of model, one-half inch equals 1 foot.

At the date when the *Proctor* was built the pursuit of cod on the coast of Labrador was quite an important branch of the New England fisheries, and it was not uncommon for vessels to be built with particular reference to engaging in that industry. Subsequently the fishery was abandoned by Americans.

The *Proctor* is an excellent typical representative of the full-bowed, square-sterned vessels built for the New England fisheries in the decade ending in 1850. They were generally rigged with one topmast and no jib boom, and carried four sails—mainsail, foresail, jib, and main staysail. Those engaging in the winter codfishery on Georges Bank carried no topmast. Many of those following the summer mackerel fishery had jib booms and occasionally one has a fore-topmast, with corresponding sails.

Deposited by the Bureau of Fisheries. Cat. No. 76,248 U.S.N.M.

Model of market-fishing schooner.

The market fishing schooner *Sylph* was designed by D. J. Lawlor and built at Chelsea, Mass., in 1865. At that date she represented the highest attainment in the construction of swift schooners of moderate dimensions for prosecuting the deep-sea market fishery.

The schooner had a sharp bow; raking stem; projecting cutwater or long head; sharp floor: high, quick bilge; long, easy, hollow run: elliptical, slightly overhanging stern; good sheer; cabin trunk aft: forecastle companionway aft of foremast. Heavy drag, the difference between draft forward and aft being very marked. Masts rake strongly. Carries single topmast and five sails—mainsail, foresail, jib, main staysail, and main gaff-topsail.

Dimensions of vessel.—Length over all, 61 feet; on water line, 55 feet 6 inches; beam, 17 feet; depth of hold, 5 feet 3 inches; mainmast, above deck, 54 feet; foremast, above deck, 52 feet; bowsprit, 27 feet; foreboom, 19 feet; foregaff, 18 feet; main boom, 47 feet; main gaff, 23 feet; topmast, 27 feet. Scale of model, one-half inch equals 1 foot.

Vessels of this type sat low in the water; they were heavily ballasted with stone and iron, and, though having an extraordinary spread of canvas, carried their sails well in strong winds. The deep skag or heel was considered necessary to make them "hold on" in windward sailing.

Deposited by the Bureau of Fisheries. Cat. No. 76,241 U.S.N.M.

Model of fishing schooner.

The schooner *Elisha Holmes* was built at Essex, Mass., in 1849 to engage in the cod and mackerel fisheries. She is typically representative of a class of vessels extensively used between 1845 and 1860, and was one of the so-called "sharpshooters" of that period. During the transition from full bowed to sharper schooners, many held that it would be unsafe to have a vessel sharp on the rail. It was thought that with a strong flare above water, and a full round bow at the rail, a vessel would be safer and not so liable to plunge heavily into a sea. Consequently, fishing schooners were often built that way: the *Elisha Holmes* is a good example.

This was a carvel-built, wooden, keel vessel; bow flaring, full and round on top, convexly sharper below; curved raking stem; long head; long straight sides; comparatively narrow beam; low bilge, short floor; long, but rather full run; broad square stern. Rigged as a two-masted schooner with a single topmast, carrying jib, foresail, mainsail, and main staysail.

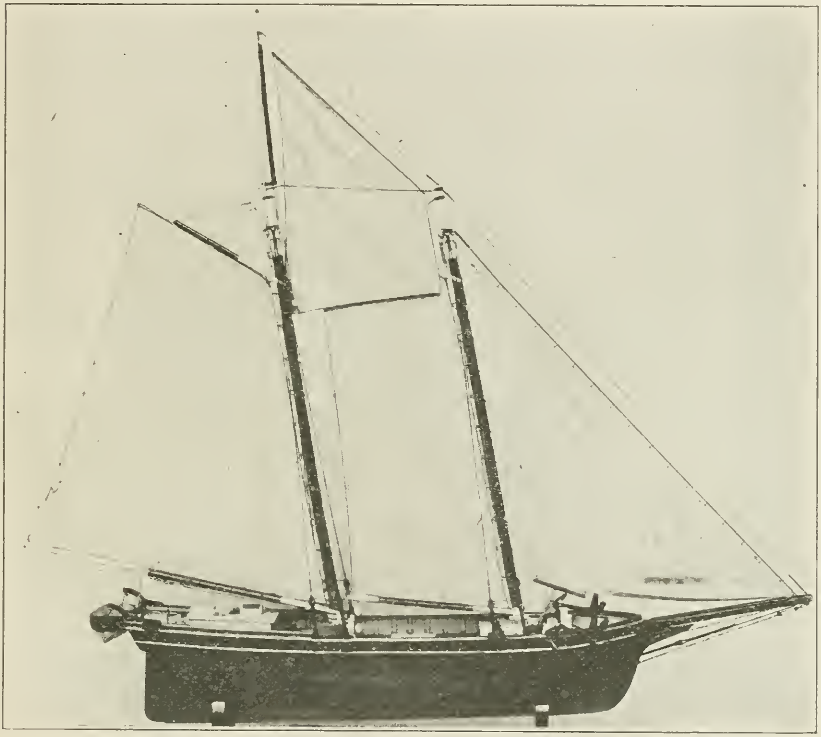


FIG. 35.—NEW ENGLAND SCHOONER "ELISHA HOLMES."

Dimensions of vessel.—Length over all, 67 feet; on lower water line, 64 feet; beam, 18 feet; depth of hold, 7 feet 6 inches; extreme draft, 9 feet 6 inches; bowsprit, extreme length, 32 feet; foremast, above deck, 60 feet; mainmast, above deck, 61 feet; foreboom, 21 feet; foregaff, 20 feet; main boom, 44 feet; main gaff, 21 feet. Scale of model, one-half inch equals 1 foot.

Vessels of this class were employed chiefly in the codfishery on Georges Bank, and in the summer mackerel fishery.

Deposited by the Bureau of Fisheries. Cat. No. 76,247 U.S.N.M.

Model of fishing schooner.

The fishing schooner *Dauntless* was built at Essex, Mass., about 1855. She was a wooden, carvel-built vessel of the early clipper type; with bow strongly flaring; full and round at rail; convexly sharper at and below water line; raking stem; long head: rising floor: quick turn to bilge; long easy run; large, square stern; strong drag; rather straight on top; low quarter-deck; masts rake strongly; dories stowed bottom up on deck and lashed: riding sail on davit plank.

Dimensions of vessel.—Length over all, 70 feet; water line, 66 feet; beam, 17 feet 6 inches: bowsprit, 30 feet; flying jib boom, 32 feet: foremast, above deck, 54 feet; foreboom, 24 feet, mainmast, above deck, 56 feet: topmast, 29 feet: main boom, 42 feet; main gaff, 22 feet. Scale of model, one-half inch equals 1 foot.

The vessel is represented as she might appear in making a passage to the banks on a trawling trip. All sails are set as follows: flying jib, jib, foresail, mainsail, main staysail, and main gaff-topsail. This model is an excellent representation of the early type of clipper fishing schooners built at Essex, at the time it was thought necessary to give them an excessive flare to the bow to prevent them from pitching heavily in a seaway.

The *Dauntless* was lost in 1870, with her crew of 12 men, while making a passage from home to the Gulf of St. Lawrence.

Deposited by Bureau of Fisheries. Cat. No. 76,244 U.S.N.M.

Model of fishing schooner.

The schooner, *Etta G. Fogg*, was built at Essex, Mass., in 1857, for employment in the summer mackerel fishery and for freighting oysters in winter from Chesapeake Bay to New England. In form and rig she represents the highest attainment in designing clipper fishing vessels at the period when she was built, at which time she was one of the largest schooners employed in the food fisheries from New England.

The *Etta G. Fogg* was a carvel-built, wooden, keel vessel, with sharp bow; moderate rise to floor; long, lean run; broad square stern; raking stem; long head; good sheer; long, low quarter-deck; cabin trunk aft; forecastle companionway forward—aft of foremast—hatches, pumps, fitted with bait boxes, etc., to show the position of these for use in the mackerel hook-and-line fishery. Rigged as a two-topmast schooner, and carrying mainsail, foresail, jib, flying jib, jib-headed foregaff-topsail, jib-headed main gaff-topsail and main staysail.

Dimensions of vessel.—Length over all, 94 feet; beam, 23 feet; depth of hold, 9 feet 6 inches; bowsprit, extreme length, 36 feet; jib boom, outside cap, 17 feet; foremast, above deck, 67 feet 6 inches; foretopmast, 37 feet; mainmast, above deck, 70 feet; main topmast, 37 feet; foreboom, 30 feet; foregaff, 29 feet; main boom, 58 feet; main gaff, 33 feet. Scale of model, one-half inch equals 1 foot.

This type of sharp, broad sterned, and rather shallow fishing schooner predominated in New England until 1886. It was evolved from the combined necessities of the oyster trade, which required a vessel of moderate draft to enter the tributaries of the Chesapeake, and of the mackerel fishery, which demanded large deck room and much initial stability. The form was dangerous in gales and has since been superseded by a safer type.

Gift of Charles O. Story. Cat. No. 76,254 U.S.N.M.

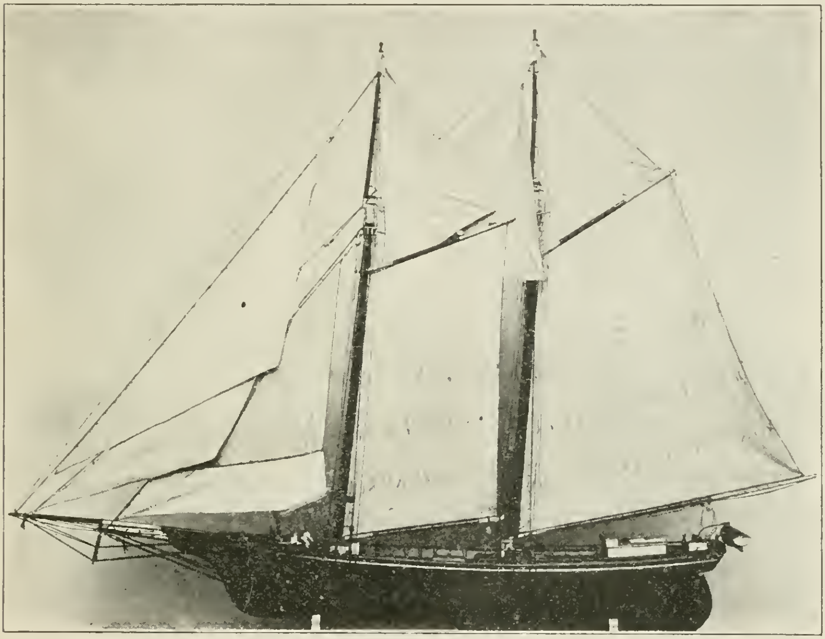


FIG. 36.—NEW ENGLAND SCHOONER "ETTA G. FOGG."

Model of fishing schooner.

This is a type of fishing schooner used in the New England fisheries from 1850 to 1860. It had a moderately sharp, round bow; broad beam; deep bilge; square stern; rigged as a two-masted schooner with single topmast and jib boom.

Dimensions of vessel.—Length over all, 66 feet 4 inches; beam, 21 feet 6 inches; bowsprit, outboard, 16 feet 8 inches; jib boom, 13 feet 4 inches; foremast, above deck, 62 feet; mainmast, above deck, 63 feet; main topmast, 31 feet; main boom, 46 feet. Scale of model, three-eighths inch equals 1 foot. Cat. No. 25,731 U.S.N.M.

Model of fishing schooner.

The schooner, *Flying Fish*, built at Essex, Mass., was designed primarily for employment in the mackerel hook-and-line fishery, in which she engaged for several years from Gloucester, Mass. Subsequently she was sold to New London, Conn., after which she participated in the Antarctic fur-seal and sea-elephant fisheries.

The vessel was a wooden, carvel-built, two-masted, keel schooner, with moderately sharp bow; raking stem; long head; rising floor; long, sharp run; straight, nearly vertical sternpost; elliptical stern; moderate sheer; long, low quarter-deck.

Dimensions of vessel.—Length over all, 74 feet; beam, 21 feet; depth of hold, 7 feet; draft extreme, 9 feet 6 inches. (For dimensions of spars, see label on sail plan.) Scale of model, 2 inches equal 1 foot.

The *Flying Fish* was among the swiftest vessels of her class at the time when she was built. Her speed was probably due in a considerable degree to the large area of canvas which she carried.

Made in the Museum. Cat. No. 160,411 U.S.N.M.

Model of market-fishing schooner.

The schooner *Mary O'Dell* was built at Bath, Me., in 1872, for the New England market fishery, in which she was employed from Gloucester, Mass., for a number of years. She had a long, sharp bow; raking stem; long head, sharp, slightly hollow floor; long, strongly concaved run; heavy elliptical stern; long quarter-deck; fair sheer; rigged complete with all sails (mainsail, foresail, jib, flying jib, staysail, and gaff-topsail) set.

Dimensions of vessel.—Length between perpendiculars, 71 feet; beam, 20 feet; depth, 7 feet; net tonnage, 46.05; bowsprit, outboard, 18 feet 9 inches; jib boom, cap to end, 12 feet 6 inches; foremast, above deck, 65 feet; mainmast, 66 feet; main topmast, 31 feet 10 inches; fore boom, 24 feet 4 inches; main boom, 58 feet 9 inches. Scale of model, two-fifths inch equals 1 foot.

This model is representative of a class of vessels employed in the mackerel fishery in summer and in the cod and haddock fisheries in winter; carrying their fish, as a rule, to market in a fresh condition. These schooners vary from 35 to 75 tons, and are specially designed for speed and for ability to carry a large amount of canvas.

The *Mary O'Dell*, after following the New England market fishery for some years, was sold to Savannah, Ga., from which port she was employed in fishing for the market.

Cat. No. 39,337 U.S.N.M.

Model of seining schooner.

The schooner *Mary Fernald*, of Gloucester, Mass., was built at that port in 1875, for employment in the summer mackerel fishery with purse seines, and in the winter for the frozen-herring trade. This model of her is mounted to represent the extreme clipper fishing schooner (at the date when she was built) on a mackerel cruise. She is under full sail, seine boat on port side, with a purse seine stowed in it; dory towing astern.

Dimensions of vessel.—Length over all, 78 feet; beam, 22 feet; depth, 7 feet; net tonnage, 76.17; bowsprit, outside, 20 feet 6 inches; jib boom, outside cap, 14 feet 6 inches; foremast, above deck, 62 feet 6 inches; foretopmast, heel to truck, 36 feet; foreboom, 26 feet; foregaff, 26 feet; mainmast, above deck, 64 feet; main topmast, 36 feet; main boom, 56 feet 6 inches; main gaff, 28 feet 6 inches; seine boat, 36 feet 6 inches long over all, 8 feet 6 inches wide. Scale of model, one-half inch equals 1 foot.

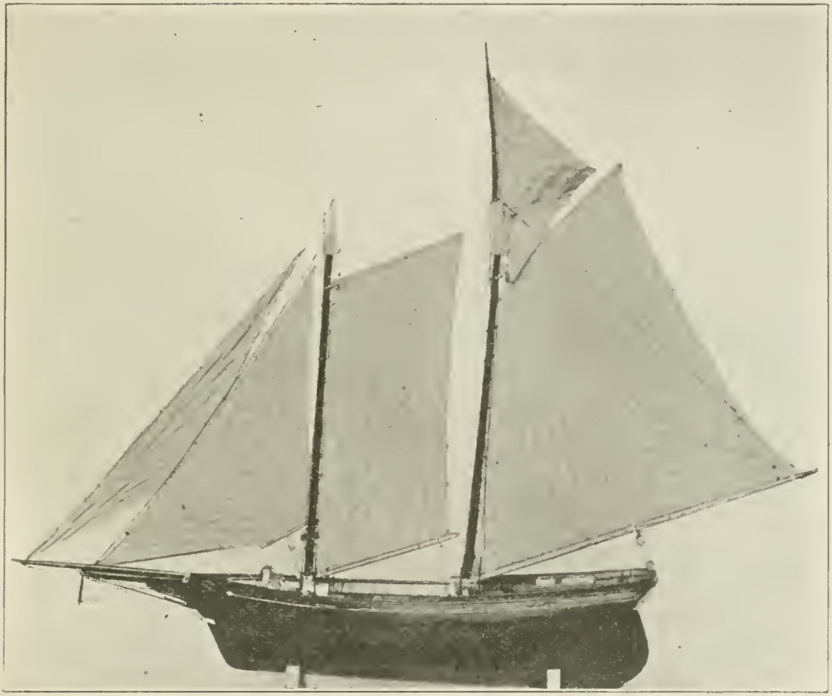


FIG. 37.—NEW ENGLAND SCHOONER "MARY O'DELL."

The *Mary Fernald* illustrates the extreme to which designers of fishing vessels went in producing wide, shallow, sharp schooners, having broad heavy sterns, and the underwater after section so hollowed out as to produce abrupt curves, the lower part of the run being substantially a skag. These vessels, having excessive initial stability, carried a large area of canvas; they were heavily sparred, and in gales were dangerous, since the center of gravity was so high that they had little or no righting power when knocked down by a breaking wave.

Deposited by the Bureau of Fisheries. Cat. No. 76.246 U.S.N.M.

Model of fishing schooner.

The schooner *William M. Gaffney* was built at Gloucester, Mass., in 1877 for employment in the purse seine mackerel fishery. She has also been employed to some extent in the frozen-herring trade in winter, going to New Brunswick harbors for cargoes.

The vessel was of the extreme type of beamy, shallow clipper fishing schooner of the period; long, sharp bow; raking stem; long head; considerable rise to floor; long and very hollow run, with heavy flat quarters and counters; broad and heavy elliptical stern; graceful sheer; long low quarter; all sails set; mackerel pocket rigged out to illustrate its use.

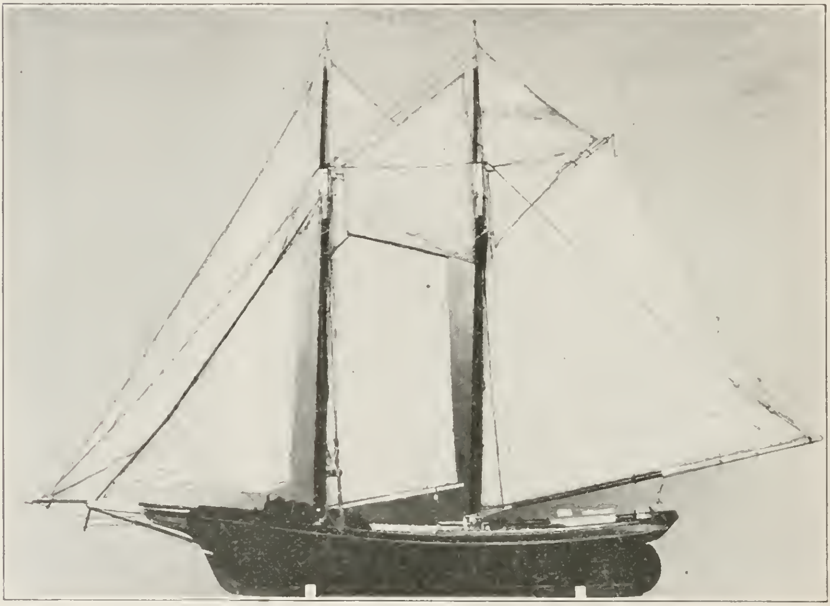


FIG. 38.—NEW ENGLAND CLIPPER SCHOONER "WM. M. GAFFNEY."

Dimensions of vessel.—Length between perpendiculars, 80 feet; beam, 22 feet; depth, 7 feet; gross tonnage, 74.65; bowsprit, outboard, 18 feet; jib boom, cap to end, 12 feet; foremast and foretopmast, above deck, 84 feet; mainmast and main topmast, above deck, 85 feet; main boom, 56 feet. Scale of model, one-half inch equals 1 foot.

The model represents a clipper schooner of about 75 tons, with all sails (mainsail, foresail, jib, flying jib, jib topsail, or ballon jib.

main staysail, fore and main gaff-topsails) set; the rig is that of a two-topmast schooner. The type was superseded in the mackerel fishery by deeper, safer, and swifter schooners.

Lent by John Bishop. Cat. No. 39,487 U.S.N.M.

Model of fishing schooner.

The two-masted schooner, *Spencer F. Baird* was built at Essex, Mass., in 1882, for the general deep-sea fisheries, but more particularly for the Grand Bank codfishery. She was named in honor of the distinguished head and founder of the United States Fish Commission and Secretary of the Smithsonian Institution.

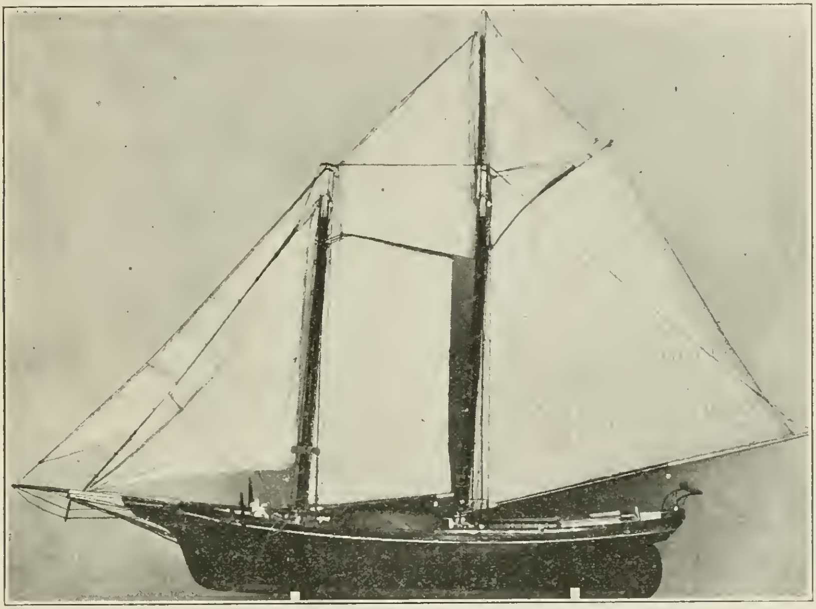


FIG. 39.—NEW ENGLAND CLIPPER SCHOONER "SPENCER F. BAIRD."

This was a wooden, carvel-built, keel, clipper schooner, with sharp bow; raking stem, long head; rising floor; long and very hollow run; heavy flat counters; large elliptical stern; graceful sheer; long, low quarter-deck; model completely rigged, with all sails set; cabin trunk, forecastle, companionway, etc.

Dimensions of vessel.—Length over all, 86 feet; for tonnage, 76 feet 7 inches; beam, 22 feet 2½ inches; depth, 8 feet; net tonnage, 74.14; bowsprit, outboard, 19 feet; jib boom, cap to end, 12 feet 8 inches; foremast, above deck, 64 feet; mainmast, above deck, 65 feet; main topmast, 36 feet; main boom, 62 feet; foreboom, 25 feet. Scale, one-half inch equals 1 foot.

The model represents a clipper schooner of about 75 tons, with mainsail, foresail, jib, flying jib, staysail, and gaff-topsail set; riding sail lashed on davit plank, and dories inverted and lashed on checker planks, as they usually are when the vessel is making a passage to or from the Banks.

Lent by John Bishop. Cat. No. 56,939 U.S.N.M.

Model of three-masted fishing schooner.

This is a type of fishing schooner of which several were built for the Grand Bank codfishery between 1865 and 1885; one was designed especially for the purse seine mackerel fishery but was subsequently sold to Portugal.

A wooden, carvel-built, keel vessel, with sharp bow; raking stem; curved at forefoot; long head with fiddle head at end, and carved and gilded vine on trail board; rising floor; quick bilge; long, hollow, lean run, with heavy flat quarters; straight nearly vertical sternpost; wide elliptical stern; fine sheer; long, quarter-deck large cabin trunk abaft mizzenmast; oil butts stowed on bilge forward of cabin; equipped with wooden jump-brake windlass; anchors, chain and rope cables; forecastle companionway; hatches; wheel box; 20 dories stowed in nests on deck; yawl boat at stern davits, etc.

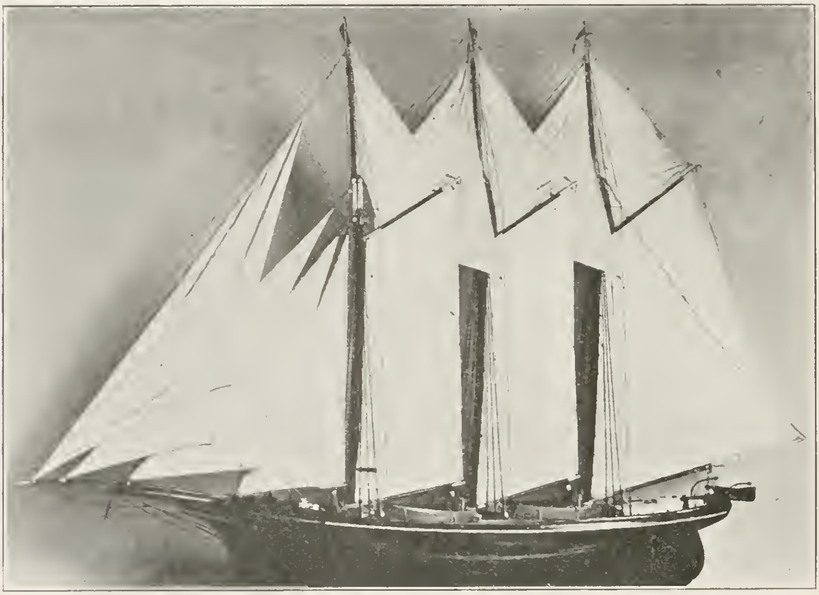


FIG. 40.—NEW ENGLAND THREE-MASTED SCHOONER.

Dimensions of vessel.—Length over all, 109 feet; beam, 26 feet; depth of hold, 10 feet; draft of water aft, 11 feet; forward, 8 feet; bowsprit, outboard, 22½ feet; jib boom, outside cap, 19 feet; foremast, above deck, 70 feet 3 inches; foretopmast, heel to truck, 40 feet; mizzenmast, above deck, 73 feet 3 inches; mizzen topmast, 40 feet; fore and main booms, each 23 feet 8 inches; fore and main gaff, each 23 feet 6 inches; spanker boom, 53 feet 3 inches; spanker gaff, 29 feet 9 inches; yawl boat, 17 feet 6 inches long, 5 feet wide and 3 feet deep. Scale of model, one-half inch equals 1 foot.

The model was made by Mr. Thomas A. Irving, of Gloucester, as an ideal three-masted fishing schooner, and it was named from the schooner, *Lizzie W. Matheson*, though it differs considerably from that vessel in the shape of its hull. At the International Fisheries Exposition in London, 1883, it was awarded a gold medal.

Cat. No. 160,211 U.S.N.M.

Model of fishing schooner.

The schooner, *James A. Garfield*, was built at Bath, Me., in 1881, to engage in the codfishery on Georges Bank, from Gloucester, Mass. Vessels of this class, employed in the Georges hand line codfishery, are fitted with gurry pens on deck; softwood fishing rails; stern dory, etc. She was a clipper, keel schooner, with sharp bow; curved raking stem; long head; moderate rise to floor; long, hollow run; heavy flat counters; large elliptical stern; fair sheer; long, low quarter-deck; all sails set.

Dimensions of vessel.—Length between perpendiculars, 74 feet; beam 22 feet; depth 8 feet; net tonnage, 69.90; bowsprit, outboard, 19 feet; foremast, above deck, 60 feet; mainmast, above deck, 60 feet 6 inches; main topmast, 33 feet; foreboom, 23 feet 6 inches; main boom, 60 feet. Scale of model, one-half inch equals 1 foot.

The model represents a clipper schooner of about 70 tons register in ordinary rig, such as many of this class carry all the year, though in winter some vessels have no main topmast. All sails (mainsail, foresail, jib, main staysail, and gaff topsail) are set, and the riding sail lashed to davit plank, as is usually the case when these vessels are making a passage to or from the Banks. When at anchor on the Bank only the riding sail is set; this is triangular in shape and is bent to the mainmast by adjustable hoops.

Deposited by the Bureau of Fisheries. Cat. No. 56,938 U.S.N.M.

Model of fishing schooner.

This is a type of fishing schooner designed for the Atlantic deep-sea food-fish fisheries by Edward Burgess, of Boston, Mass. She was built at Essex, Mass., in 1889 and represents the extreme clipper fishing schooner of that period, as well as the highest attainment in designing vessels for the ocean fisheries. She differs from the sharp, shallow, broad sterned New England fishing schooner in vogue from 1865 to 1886, chiefly in having greater depth, less beam, a narrow V-shaped stern, finer and more symmetrical lines, and a different arrangement of sails and spars.

The *Fredonia* is a carvel-built, wooden keel vessel, with long sharp bow; raking stem, small gammon knee head: deep keel; sharp floor; long fine run; narrow, overhanging, V-shaped, strongly raking stern; raking sternpost: good sheer: low quarter-deck extending forward of mainmast; cabin trunk aft; forecastle companionway; hatches on deck, etc. Rigged as a two-topmast schooner, with (comparatively small) round bowsprit; short foremast and foretopmast; long mainmast and main topmast; sails peak more sharply than an old-style fishing vessel.

Dimensions of vessel.—Length over all, 112 feet 9 inches; beam, 23.6 feet; depth, 10.3 feet; net tonnage, 109.44; bowsprit, outside, 36 feet 9 inches; foremast, above deck, 60 feet 9 inches: foretopmast, heel to truck, 34 feet; foreboom, 29 feet; mainmast, above deck, 70 feet 3 inches; main topmast, 41 feet: main boom, 68 feet 6 inches; main gaff, 38 feet. Scale of model, one-half inch equals 1 foot.

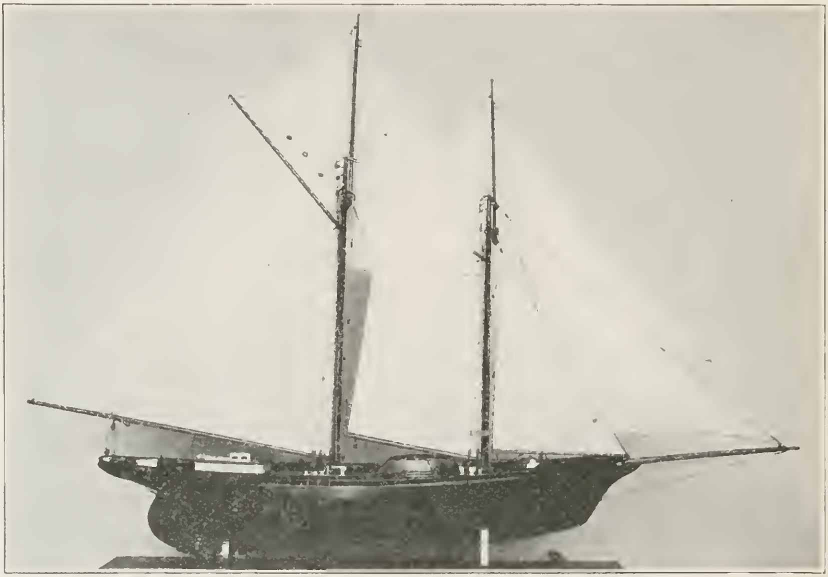


FIG. 41.—NEW ENGLAND SCHOONER "FREDONIA."

The *Fredonia* has embodied in her design the best results obtained by Mr. Burgess in yacht designing in previous years, during which he produced the famous and successful cup defenders *Puritan*, *Mayflower*, and *Volunteer*.

For some months after she was built the *Fredonia* was temporarily fitted up and used as a yacht, in which capacity she made a cruise across the Atlantic and participated in several races at home. Although at a disadvantage in having inside ballast and being without racing sails, she made a good record. Some two years later she won easily in a match race with the Boston pilot boat *Hesper*. She was thoroughly tested in the fisheries and proved preeminently swift and seaworthy. On several occasions she made successful passages against heavy northwest gales in winter, even though weighted down with ice—conditions which compelled shallow fishing schooners to heave to and drift to leeward. A large number of vessels have been built from her lines or on lines closely approximating thereto.

Deposited by the Bureau of Fisheries. Cat. No. 76,253 U.S.N.M.

Model of market-fishing schooner.

This model was made from a design by Capt. J. W. Collins for a swift market fishing schooner, embodying the most advanced ideas in form and rig. In the market fishery of New England, New York, the South Atlantic, and Gulf States, the fish are taken to port in a fresh condition. It is therefore important that sailing vessels engaging in this fishery should have a maximum of speed and seaworthiness. A consideration of these requirements resulted in producing this design as an ideal seagoing fishing schooner of moderate dimensions.

The model represents a carvel-built, keel vessel, with long, sharp bow; raking stem; gammon knee head; shallow forefoot; keel much deeper in after section than forward and "rockered" forward and aft; sharp floor; long, easy, symmetrical run; overhanging V-shaped narrow stern (the stem rakes strongly); good sheer; deck arrangements of cabin trunk, hatches, etc., on the plan ordinarily adopted on fishing vessels. The rig is that adopted on fishing vessels and schooner yachts. A round, short bowsprit; short foremast and foretopmast; long mainmast and main topmast—the mainmast stepped nearly in the center between bow and stern—are the principal features of the spar plan. Carries jib topsail; fore staysail; foresail; fore gaff-topsail; mainsail; main gaff-topsail; and main staysail.

Dimensions of vessel.—Length over all, 84 feet; on load water line, 66 feet; beam, 20 feet 3 inches; extreme draft, 10 feet 3 inches; bowsprit, outside, 24 feet; foremast, above deck, 50 feet; foretopmast, heel to truck, 30 feet; foreboom, 20 feet; foregaff, 22 feet; mainmast, above deck, 58 feet; main topmast, heel to truck, 34 feet; main boom, 55 feet; main gaff, 38 feet 6 inches; length of fore crosstree, 11 feet; main crosstree, 13 feet. Scale of model, one-half inch equals 1 foot.

Deposited by the Bureau of Fisheries. Cat. No. 76,252 U.S.N.M.

Model of fishing schooner.

The schooner, *John J. Flaherty*, of Gloucester, Mass., was built at Essex, Mass., in 1899 for Grand Bank codfishing in summer and in the winter frozen herring trade. The model represents a fast and seaworthy vessel ready to go to the Banks on a cruise. She is under full sail with dories turned up and secured on deck, and checkerboard and oil butts in place. She illustrates the extreme type of Grand Banker and is a very easy vessel to anchor in a heavy sea. Carries 2,200 barrels of herring and had 600,000 pounds of cod on her first Grand Bank trip.

The *John J. Flaherty* is a wooden, carvel-built, keel vessel with long sharp bow: raking stem: small gammon knee head; deep keel; sharp floor; narrow overhanging strongly raking stern; good sheer. Rigged as two-masted schooner.

Dimensions of vessel.—Length over all, 122 feet: water line length, 102 feet; beam, 25 feet 6 inches; depth, 12½ feet; gross tonnage, 166.35; bowsprit, outboard, 36 feet; foremast, 64 feet from deck; fore topmast, 39 feet; foreboom, 33 feet; foregaff, 34 feet; mainmast, 76 feet; main topmast, 44 feet; main boom, 70 feet; main gaff, 40 feet; jumbo boom, 28 feet. Scale of model, one-half inch equals 1 foot.

Transferred from the Bureau of Fisheries. Cat. No. 285,030 U.S.N.M.

Model of seine schooner.

The schooner, *Senator Gardner*, of Gloucester, Mass., was built in Essex, Mass., in 1900 for employment in the summer mackerel fishery and in the winter frozen herring trade; is a vessel suitable for all branches of the fisheries and is represented in the model as all ready to start on a cruise, seine boat on deck and seine stowed, ready to be taken into the boat on arrival at fishing grounds.

The vessel is a wooden, carvel-built, keel one with long, sharp bow; raking stem; small gammon knee head; deep keel; narrow overhanging raking stern; raking sternpost; good sheer. Rigged as a two-masted schooner.

Dimensions of vessel.—Length over all, 114 feet; water line length, 92 feet; beam, 25 feet; depth, 11 feet 6 inches; gross tonnage, 135; bowsprit outboard, 30 feet; foremast from deck, 65 feet; foretopmast, 42 feet; mainmast, 70 feet; main topmast, 44 feet; main boom, 67 feet; main gaff, 37 feet; foreboom, 31 feet; foregaff, 32 feet; jumbo boom, 27 feet; seine boat, 40 feet long, over all, beam, 8 feet 6 inches. Scale of model, one-half inch equals 1 foot.

Transferred from the Bureau of Fisheries. Cat. No. 285,031 U.S.N.M.

Model of market-fishing schooner.

The schooner, *Rob Roy*, of Gloucester, Mass., was designed by B. B. Crowinshield of Boston, Mass., and built in Essex, Mass., in 1900 for employment in the market fishery. She was an entirely new type of fishing vessel and was called the "knock-about." She is an ideal market fishing craft as she is easily handled around the dories when out setting or hauling trawls, and is a smart sailer and an excellent sea boat.

The *Rob Roy* is a wooden, carvel-built keel boat; sharp bow; very short stem, extremely raking; deep keel; overhanging sharp V-shaped stern; raking sternpost. Rigged a two-masted schooner.

Dimensions of vessel.—Length overall, 110 feet; water line length, 88 feet; beam, 23 feet 6 inches; depth, 11 feet; bowsprit, outboard, 26 feet; foremast, 58 feet from deck; foretopmast, 37 feet; foreboom, 28 feet; foregaff, 27 feet; mainmast, 71 feet from deck; main topmast, 41 feet; main boom, 66 feet; main gaff, 36 feet. Scale of model, one-half inch equal 1 foot.

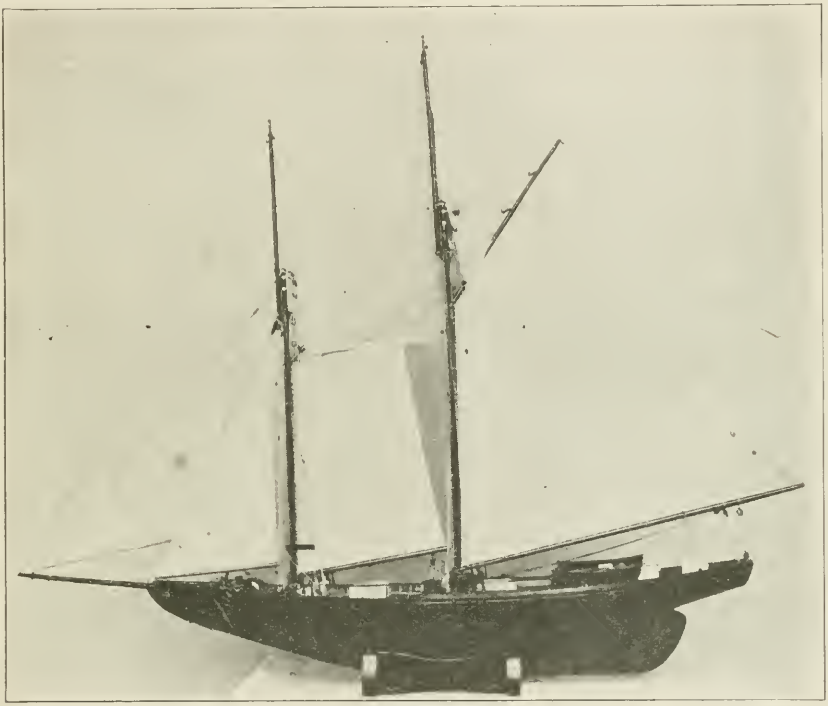


FIG. 42.—NEW ENGLAND SCHOONER "ROB ROY."

Transferred from the Bureau of Fisheries. Cat. No. 298,232 U.S.N.M.

Model of ketch.

The fishing ketch, *Resolute*, of Gloucester, Mass., of which this is a miniature, was built at Essex, Mass., in 1891 for prosecuting the beam-trawl fishery. She is the first vessel of this type ever built in the United States, and resembles in hull and rig the sailing ketch-rigged, beam-trawlers of the east coast of England, of which she is largely a copy, especially in rig and equipment.

The *Resolute* is a carvel-built, wooden, keel vessel, with sharp bow: straight and nearly vertical stem above water, curved below; rising floor; easy run; square V-shaped overhanging stern; flush deck; fitted with beam trawl and appliances for operating it. Ketch rigged, with long bowsprit; mainmast, mizzenmast, etc. The rig differs in some details from the North Sea trawlers, but chiefly because the bowsprit is stationary instead of being fitted to run in or out.

Dimensions of vessel.—Length over all, 90 feet; beam, 22 feet; depth of hold. 9.6 feet; net tonnage. 90.52; bowsprit, outside knightheads, 39 feet; mainmast. above deck. 66 feet; main topmast, 39 feet 6 inches; main boom. 41 feet 6 inches; main gaff. 39 feet; mizzenmast. above deck, 52 feet; spanker boom, 30 feet; spanker gaff, 22 feet: main gaff-topsail yard. 13 feet 6 inches; mizzen gaff-topsail yard. 10 feet 6 inches. Scale of model. one-half inch equals 1 foot.

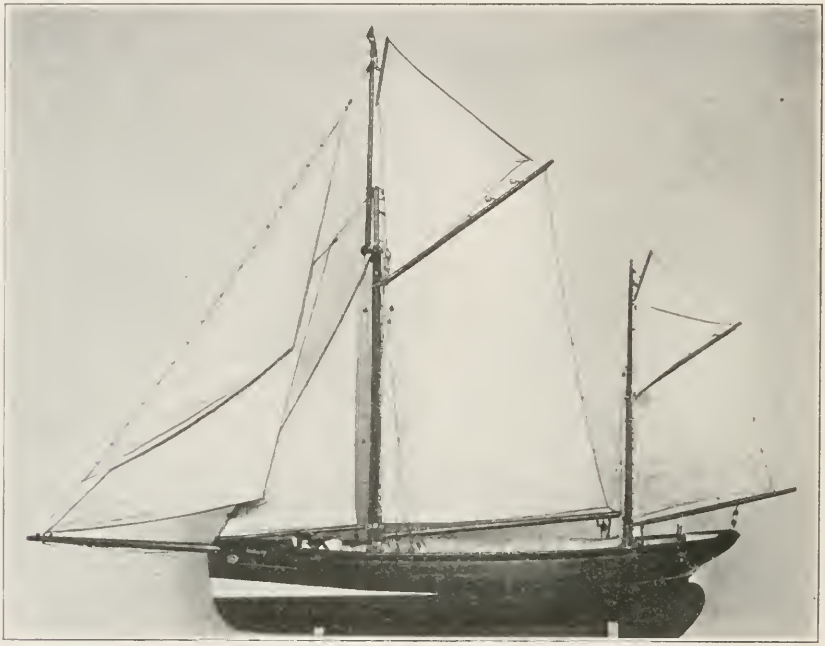


FIG. 43.—NEW ENGLAND KETCH "RESOLUTE."

The *Resolute* made a number of trips beam-trawling during the winter of 1891–92. She was unsuccessful and abandoned that fishery. Deposited by the Bureau of Fisheries. Cat. No. 76,263 U.S.N.M.

Model of smack.

This model of the schooner smack *Storm King*, of Boston, Mass., represents the class of small welled vessels employed in transporting live lobsters from the fishing grounds to the various markets of New England. They vary in size from 20 to 50 tons. Their special feature is a well in the center for keeping the lobsters alive.

The boat was a carvel-built, wooden, keel vessel, with sharp bow; rising floor; long, clean run; square stern; flush deck; well amidships for keeping alive fish, etc. The bottom of this section of the vessel is perforated with holes for the purpose of allowing a free circulation of water in the well.

Dimensions of vessel.—Length over all, 53 feet 4 inches; beam, 15 feet 8 inches; depth of hold, 7 feet 4 inches; draft of water, aft, 7 feet 6 inches. Length of spars bowsprit, outside, 14 feet 8 inches; foremast, above deck, 47 feet 6 inches; main topmast, 16 feet; foreboom, 14 feet 8 inches; main boom, 38 feet 9 inches. Scale of model, three-fourths inch equals 1 foot.

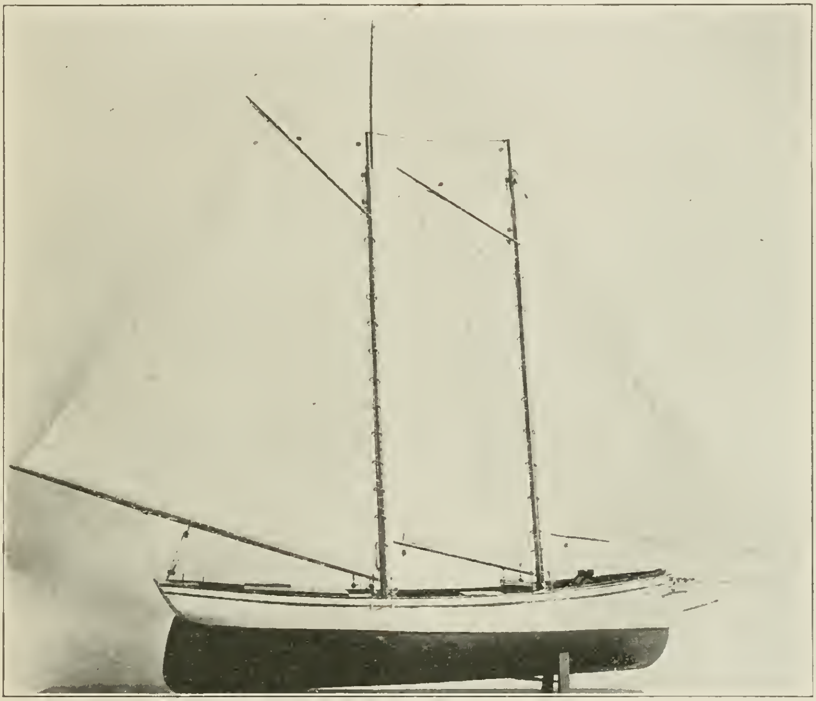


FIG. 44.—NEW ENGLAND SMACK "STORM KING."

Gift of Johnson and Young. Cat. No. 26,584 U.S.N.M.

Model of smack.

The welled schooner, *John W. Lowe*, of Key West, Fla., was built in 1875 to engage in the market fishery from that port. The catch is mostly kept alive in a well in the center of the vessel. On the Atlantic coast of the United States a welled vessel is called a smack.

In hull and rig this model represents the typical fishing smacks of southern New England, from which the Key West schooners have been copied.

The boat was a carvel-built, wooden keel vessel, with sharp bow; rising floor; long run; wide square stern; flush deck; moderate sheer; large cabin trunk aft; well amidships; hatches, etc.

Dimensions of vessel.—Length over all, 68 feet; beam, 19 feet; depth, 6 feet 9 inches. Scale of model, one-half inch equals 1 foot.

This type of fishing vessel was first introduced in the Florida fisheries by New England fishermen. Subsequently they were built of native woods at Key West. They were profitably employed in supplying the market of Havana, Cuba, with live fish until the tariff on such products was made practically prohibitive.

Deposited by the Bureau of Fisheries. Cat. No. 76.257 U.S.N.M.

Model of schooner.

The schooner *City of Key West* was built for the sponge fishery at Key West, Fla., in 1884. She is a typical representative of the modern, shallow centerboard schooners employed in taking sponges along the Florida coast, for which fishery light draft vessels are required.

The *City of Key West* is a carvel-built wooden vessel, with sharp bow, rather flat floor; easy run; flat counters and round stern; shallow keel; deep centerboard.

Dimensions of vessel.—Tonnage length, 41.3 feet; depth, 3.5 feet; net tonnage, 12.86. Scale of model, one-half inch equals 1 foot.

Deposited by the Bureau of Fisheries. Cat. No. 76,261 U.S.N.M.

Model of pungy.

The schooner *W. F. McKewen* is a typical oyster "pungy" of the Chesapeake Bay region, where hundreds of such vessels are employed. She was built in 1865 and was engaged in dredging oysters for many years.

The *McKewen* is a carvel-built, wooden, keel vessel, with moderately sharp flaring bow; curved, strongly raking stem; long head; sharp floor; long, lean run; shallow, square stern; raking sternpost; flush deck; log rail, except aft of main rigging, where there is an open quarter rail; rollers on rail amidships for dredge rope to pass over; typical schooner rig. Model equipped with oyster dredges, winches, etc.

Dimensions of vessel.—Length over all, 68 feet; beam, 20 feet 9 inches; depth, 7 feet. Scale of model, one-half inch equals 1 foot.

The builders at Baltimore and other ports on the Chesapeake began the construction of sharp vessels much earlier than elsewhere on the

Atlantic coast, and oyster "pungies" substantially like those used in the closing years of the nineteenth century were built as early as 1845 or 1850. Almost without exception these are keel vessels, with tall raking masts, long bowsprit, and high, narrow sails. They are swift and quick in stays.

Deposited by the Bureau of Fisheries. Cat. No. 76,262 U.S.N.M.

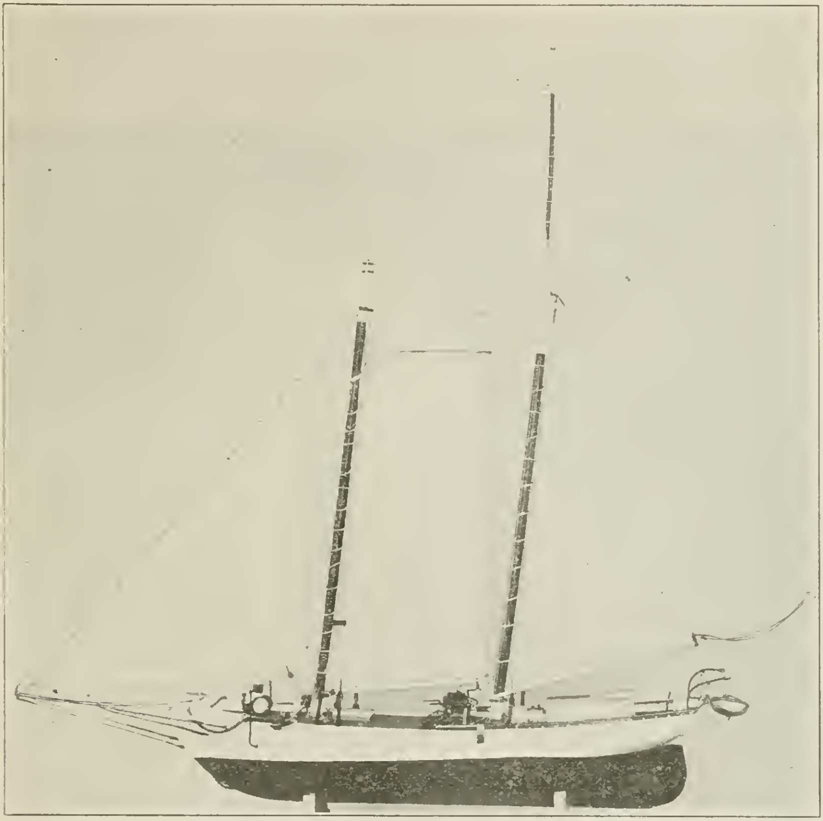


FIG. 45.—CHESAPEAKE BAY PUNGY "W. F. MC KEWEN."

Model of schooner.

This model represents the class of vessels most extensively employed in the oyster fisheries of the Chesapeake and its tributaries. They vary in size from about 15 to 45 tons, are all schooner rigged, with main topmast, but rarely carry flying jib. They are good sailers and "handy."

They have moderately sharp rounding bow; long cutwater and very slanting stem; broad beam; high bilge, with much "dead rise"; long run; square stern; decked; cabin aft. Equipped with oyster dredges, winches, etc.; spars, standing and running rigging, and sail complete.

Dimensions of vessel.—Length over all, 47 feet 3 inches; beam, 15 feet; depth, 4 feet; bowsprit, outboard, 16 feet; foremast, above deck, 44 feet 6 inches; mainmast, above deck, 45 feet; main topmast, 18 feet; main boom, 26 feet. Scale of model, 1 inch equals 1 foot.

Gift of T. B. Ferguson. Cat. No. 26,536 U.S.N.M.

Model of schooner.

A type of clipper schooner extensively employed in the oyster fishery of Chesapeake Bay and tributaries.

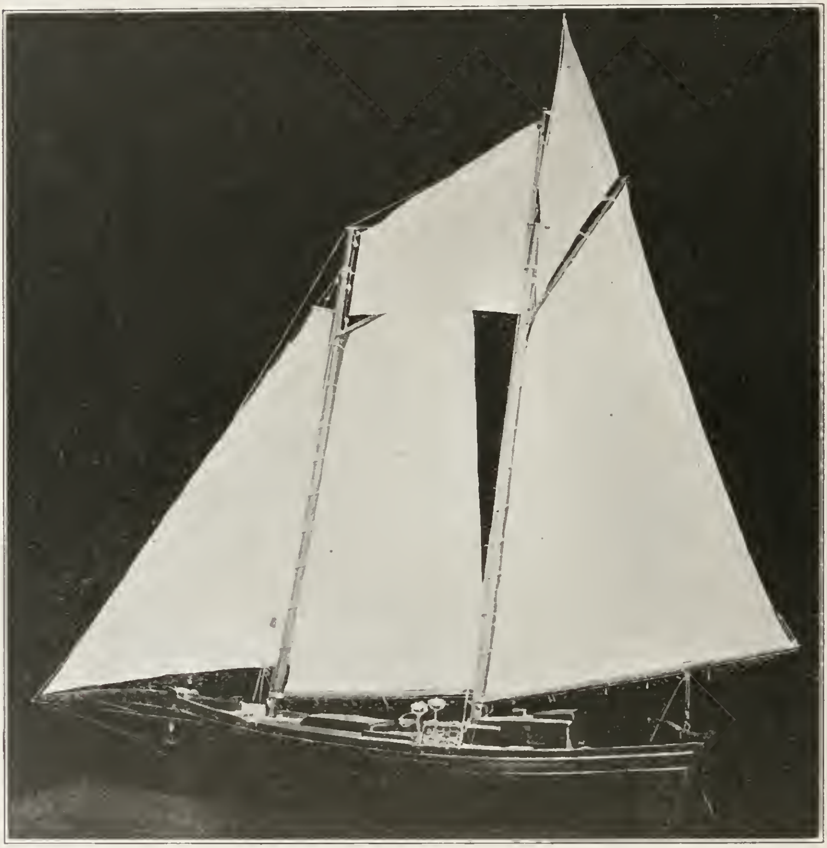


FIG. 46.—CHESAPEAKE BAY SCHOONER.

It is schooner rigged, with all sails (mainsail, foresail, jib, staysail, and gaff-topsail) set; sharp aft; moderately sharp-rounding bow; low bilge; rather flat floor. Fitted with oyster rakes, winches, etc.

Dimensions of vessel.—Length over all, 48 feet; beam, 12 feet; depth, 4 feet; bowsprit, outboard, 13 feet 6 inches; foremost, above deck, 38 feet 6 inches; main topmast, 7 feet 6 inches; main boom, 25 feet. Scale of model, 1 inch equals 1 foot.

Gift of T. B. Ferguson. Cat. No. 42,757 U.S.N.M.

Model of bugeye.

Vessels of this description are largely used in the oyster fishery of Chesapeake Bay. They vary in size from 10 to 20 tons; are good sea boats and fast sailers.

This vessel is schooner rigged, with mainsail, foresail, jib, main gaff-topsail, and stay sail (the latter not set); sharp bow and stern; fine entrance and counter lines; moderate length of run; flat floor. Usually carries centerboard. Fitted with two oyster-rake dredges, winches, etc.

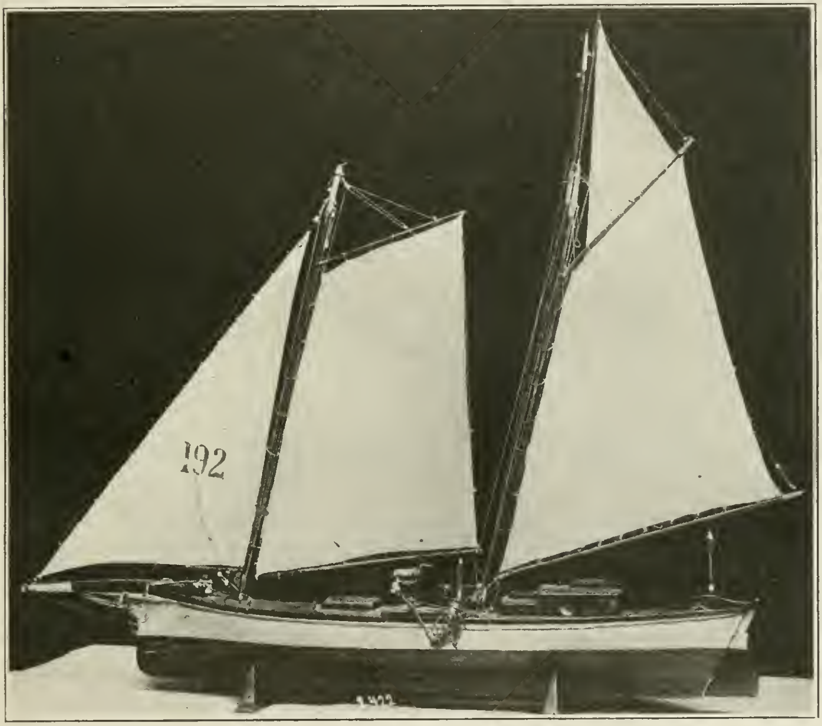


FIG. 47.—CHESAPEAKE BAY BUGEYE.

Dimensions of vessel.—Length over all, 36 feet; keel, 33 feet; beam, 7½ feet; depth of hold, 4 feet; mainmast, above deck, 25 feet; main topmast, 10 feet 6 inches; main boom, 18 feet; main gaff, 10 feet; foremast, above deck, 25 feet; foreboom, 10 feet; foregaff, 9 feet; bowsprit, outboard, 9 feet 6 inches. Scale of model, 1 inch equals 1 foot. Cat. No. 55,807 U.S.N.M.

Model of bugeye.

The *Lilly Sterling* was built in 1885 for the Chesapeake oyster fishery, in which industry large numbers of vessels of this type find employment.

This is a carvel-built, wooden, centerboard vessel; sharp forward and aft; rather flat floor; round bilge; raking stem and sternpost; long head; rudder hung outside; leg-of-mutton rig; strongly raking masts.

Dimensions of vessel.—Length over all, 45 feet; beam, 13 feet 6 inches; moulded depth, 3 feet 6 inches. Scale, one-half inch equals 1 foot.

The "bugeye" is a canoe-shaped vessel which is popular among the oyster fishermen of the Chesapeake Bay region, where alone it is used. It derives its origin from the smaller dugout canoes so extensively employed for tonging oysters in Chesapeake Bay and its tributaries. At first the bugeye was built of several logs that were fastened together and then shaped to the proper form outside and hollowed out on the inside. When timber became difficult of procurement, vessels of this type were built in the usual way, being framed and planked. They have also been made larger than at first. Generally they are shallow and have centerboards. The masts rake excessively, as a rule; the foremast is much longer than the mainmast; two leg-of-mutton sails and a jib are carried. Bugeyes sail well, especially when close hauled in a fresh breeze. Not having any light sails they are at a disadvantage in moderate winds, and the great rake of the masts prevents the best results when running before the wind. Originally it was common to paint a large circle or eye on each side of the bow and from this practice the typical name originated.

Deposited by the Bureau of Fisheries. Cat. No. 76,256 U.S.N.M.

Block model of pinkstern schooner.

The "pinky," *July*, of which this is a model, was built at Essex in the month of July, 1837. Pinkies were used in the fisheries of the New England coast from 1815 to 1840, and a few old ones still survive at Gloucester and fishing ports in eastern Maine. They were celebrated for their seaworthiness and were good sailers for the period when they were built.

The *July* was a wooden, carvel-built vessel; with full high bow; long round floor; sharp stem, with "pink;" strong sheer; flush deck.

Dimensions of vessel.—Length over all, 52 feet; beam, 16 feet; depth of hold, 7 feet; draft of water, 8 feet aft and 5 feet forward. Scale of model, one-half inch equals 1 foot.

Cat. No. 54,453 U.S.N.M.

Block model of pinky schooner.

The *Trenton* was built from this model about 1840, at Trenton, Me., to engage in the cod fisheries in the Gulf of Maine and Bay of Fundy, and was one of the last vessels of this type built in the United States. She was a carvel-built, wooden-keel vessel with bow full and strongly convex; stem curved; keel shallow; floor low, long and round; run rather short and full; sternpost raking; stern sharp and surmounted by projecting " pink;" sheer moderate.

Dimensions of vessel.—Length, 47 feet; beam, 14 feet 2 inches; depth, 6 feet 4 inches. Scale of model, one-half inch equals 1 foot.

Gift of Gillman Hodgkins. Cat. No. 76,296 U.S.N.M.

Block model of schooner.

This model of a fishing schooner was made about 1840, and shows the form of the square stern vessels of that period. It was one of the first block models made at Essex, Mass. Previous to that time fishing schooners were built "by the eye," without models, or "laid down" from a skeleton model. It calls for a vessel having a full, round bow; narrow beam; long, straight side; long, rounding "kettle" bottom; very short run; square stern.

Dimensions of vessel.—Length over all, 60 feet; beam, 16 feet; draft of water aft, 8 feet 6 inches. Scale of model, one-half inch equal 1 foot.

Gift of Jeremiah Burnham. Cat. No. 54,449 U.S.N.M.

Block model of schooner.

A schooner, name unknown, was built from this model at Essex, Mass., about 1845, to engage in the Grand Bank codfishery from Beverly, Mass. The model is typically representative of the Beverly bankers of that time. They had moderately sharp bows for the period and were well designed for riding at anchor, and for seaworthiness, though they were slow sailers.

This model has a full, strongly convex bow; long, straight of breadth; rather narrow, low floor; full run of medium length; square stern.

Dimensions of vessel.—Length over all, 64 feet; beam, 16 feet; draft of water aft, 8 feet. Scale of model, one-half inch equals 1 foot. Cat. No. 54,427 U.S.N.M.

Block model of clipper schooner.

The centerboard fishing schooner *C. Chase* was built from this model at Baltimore in 1846 for individuals in Wellfleet, Mass. In the decade between 1845 and 1855, when the New England fishing fleet was undergoing a transition, and a strenuous effort was being made to improve the vessels in the quality of speed, a considerable number of Baltimore-built schooners were employed, more especially from Cape Cod ports, in the mackerel fishery in summer, and in transporting oysters in winter from the Chesapeake Bay region to New England. With few exceptions, these Baltimore vessels were wide and shallow keel craft, with sharp floors and easy lines forward and aft, for the period in which they were built. They usually were swift sailers in ordinary weather, and at one time were in favor with the mackerel men. But they were poor sea boats, and very wet and uncomfortable in a gale, consequently they soon grew unpopular and were superseded by the stauncher New England-built schooners.

This vessel had a moderately full, convex bow; raking, curved stem; rather flat floor; round, easy bilge; long, lean run; light, square stern; very little drag; rather straight on top.

Dimensions of vessel.—Length between uprights, 60 feet; beam, 20 feet; depth of hold, 5 feet 3 inches; tonnage, 60 tons, old measurement. Scale of model, one-half inch equals 1 foot.

Gift of William Skinner & Sons. Cat. No. 76,098 U.S.N.M.

Block model of schooner.

The schooner *Susan Center* was built from this model at Essex, Mass., in 1847 and was employed from Gloucester in the cod and mackerel fisheries for many years. She represents the type of schooner built for the ocean fisheries of New England from 1845 to 1850, and which was characterized by a full bow, square stern, and low quarter-deck.

The *Susan Center* had a full round bow; straight side, long rounding bilge; short full run; square stern.

Dimensions of vessel.—Length, 60 feet over all; beam, 17 feet; draft of water aft, 9 feet. Scale of model, one-half inch equals 1 foot. Cat. No. 54,457 U.S.N.M.

Block model of schooner.

The schooner *David R. Proctor* was built from this model in 1848 at Lamoine, Me., by the designer, Louis King. She was intended for the Labrador codfishery, in which she engaged for several seasons.

The *Proctor* was a carvel-built, wooden, keel vessel of the blunt bowed type in vogue between 1840 and 1850. Her bow was round and full; stem curved; full short head; long, low round floor; rather short run; square stern.

Dimensions of vessel.—Length over all, 58 feet; beam, 16 feet 6 inches; depth, 7 feet. Scale of model, one-half inch equals 1 foot.

Cat. No. 76,295 U.S.N.M.

Block model of schooner.

A fishing schooner, name unknown, was built from this model in 1849. It was of a type extensively built for the cod and mackerel fisheries in the decade ending in 1855. They were first termed clipper-built, but at a later date were known as half-sharp. They were built sharp to attain greater speed when employed in the mackerel fishery.

This vessel had a full, convex bow; moderate rise to floor; short but rather well formed run; square stern; medium sheer.

Dimensions of vessel.—Length over all, 65 feet; beam, 18 feet; draft of water aft, 9 feet. Scale of model, one-half inch equals 1 foot.

Cat. No. 54,455 U.S.N.M.

Block model of market-fishing schooner.

A schooner was built from this model at Essex, Mass., to engage in the market fisheries. She was one of the type usually designated as "market boats"—vessels which made short trips to nearby fishing grounds and sold their catch in a fresh condition.

The model represents a wooden, carvel-built, keel vessel, with moderately sharp flaring bow; long head; sharp floor; long, lean run; broad, square stern; medium sheer.

Dimensions of vessel.—Length over all, 62 feet; beam, 19 feet; draft aft, 8 feet. Scale of model, one-half inch equals 1 foot.

The necessities incident to the market fishery required swifter vessels than any other fishery; this model, therefore, is the type of the fast-sailers of 1850. As a rule, they had very deep keels and a good deal of drag. The draft of water forward was less than one-half the draft aft. Their masts usually had a strong rake.

Cat. No. 54,466 U.S.N.M.

Block model of schooner.

A two-masted schooner, name unknown, was built from this model at Essex, Mass., in 1850, to engage in the Grand Bank codfishery from Beverly, Mass. This was the type of vessel that succeeded the full-bow schooner, and was one of the first attempts at a sharp bow. At that period it was believed to be unsafe to build vessels sharp forward without a flaring bow; they were round and full on the rail line to prevent diving when at anchor or sailing by the wind. Sometimes the flare was excessive, as in this model.

This was a wooden, carvel-built, keel schooner, of the easy clipper or "sharpshooter" type; bow strongly flaring and convexly full at rail; sharper below; raking stem; long head; moderate rise to floor; round easy bilge; long but full run; broad square stern; comparatively sheer; heavy drag, the draft forward being only about half of that aft.

Dimensions of vessel.—Length over all, 68 feet; extreme beam, 18 feet; draft of water aft, 8 feet. Scale of model, one-half inch equals 1 foot.

The noticeable characteristics of many of the vessels of this type, built about 1850, were the following: They were widest on the rail about abreast of the foremast; usually the stern was narrow and deep; they were shallow forward, with a "deep heel" aft; the bottom was often very sharp, or what, in the fisherman's vernacular, was called a "file bottom"; the head was generally much longer and more pointed than on vessels built subsequently; the masts raked strongly, and the sails were comparatively square and narrow at the head. Cat. No. 54,426 U.S.N.M.

Block model of schooner.

The schooner *Ripple* was built from this model at Essex, Mass., in 1853. She was designed for the market fishery in which she was employed for many years. She differs from the ordinary "market boat" of the period in having relatively greater beam and depth, and somewhat fuller lines. She more nearly resembles the schooners built for the Georges codfishery from the model of the *Lookout.*

She had a moderately sharp convex bow; raking stem; long head; sharp floor; deep keel; long, easy run; large, elliptical stern; good sheer.

Dimensions of vessel.—Length over all, 58 feet; beam, 17 feet; draft of water aft, 8 feet. Scale of model, one-half inch equals 1 foot.

The *Ripple* was the first fishing schooner built in Essex with an elliptical stern, a feature which subsequently came into universal use for many years. She was burned at sea in 1863 by the Confederate cruiser *Tacony.*

Gift of Joseph Story. Cat. No. 54,435 U.S.N.M.

Block model of schooner.

Type of sharp, clipper fishing schooner built in New England in 1855 for the mackerel and cod fisheries.

This vessel had a moderately sharp, round, flaring bow; low bilge; rather short floor; long, lean run; square stern.

Dimensions of vessel.—Length over all, 69 feet; beam, 18 feet; draft of water aft, 8 feet 6 inches. Scale of model, one-half inch equals 1 foot. Cat. No. 54,422 U.S.N.M.

Block model of schooner.

The two-masted schooner *J. Coolidge* was built from this model at Jordans Island, Gouldsboro, Me., in 1856.

The *Coolidge* was a wooden, carvel-built, keel vessel of the clipper type prevailing at the time she was built. She had a moderately sharp flaring bow; long floor; run of medium length and rather full; square stern; graceful sheer; long, low quarter deck.

Dimensions of vessel.—Length between perpendiculars, 65 feet 6 inches; beam, 19 feet 11 inches; depth, 6 feet 11 inches; tonnage, 52.75. Scale of model, three-eighths inch equals 1 foot.

This vessel was built chiefly for prosecuting the codfishery in the Gulf of Maine and Bay of Fundy. She was also employed in the Grand Bank codfishery, and for nine years during the spring months engaged in the herring fishery at the Magdalen Islands, bringing thence cargoes of salted herring to Maine ports.

Gift of Newell B. Coolidge. Cat. No. 76,297 U.S.N.M.

Block model of schooners.

The clipper schooners *George Fogg* and *Etta G. Fogg*, of Wellfleet, Mass., were built from this model at Essex, Mass., in 1857. They were employed in the mackerel fishery in the summer and oyster trade in the winter, and were the extreme clipper build of 1857 and far in advance of most of the vessels of that period. The oyster trade demanded fast sailers and also vessels of light draft to permit their entering the bays and rivers to the oyster grounds.

These vessels were clipper built, with sharp bow; long floor; long run, but not so lean as clipper vessels of more recent build; elliptical stern; broad beam; comparatively light draft of water.

Dimensions of vessel.—Length over all, 94 feet; beam, 23 feet; draft of water aft, 9 feet. Scale of model, one-half inch equals 1 foot.

Gift of Charles O. Story. Cat. No. 54,448 U.S.N.M.

Block model of schooner.

The schooner *Lookout*, of Gloucester, Mass., was built from this model at Essex, Mass., in 1857. Twenty or more fishing vessels were built from the same model prior to 1865, among them the *E. K. Kane*, *Fish Hawk*, *Laughing Water*, and *Arizona*. The last two vessels were employed in the Gloucester fisheries in 1882. The schooner built from this design was preferred for fishing on Georges Bank from 1857 to 1866. They were rather full-bodied vessels as compared with those built at a later date.

This vessel was built with a rather short but moderately sharp and slightly flaring bow; low full bilge; medium length of run: square stern with slight overhang.

Dimensions of vessel.—Length over all, 68 feet; beam, 19 feet 6 inches; draft of water aft, 9 feet. Scale, one-half inch equals 1 foot.

Gift of Charles O. Story. Cat. No. 54,473 U.S.N.M.

Block model of schooner.

The two-masted schooner *May Queen* was built from this model at Orland, Me., in 1858. She was employed in the bank codfishery and also in the coastwise trade.

A wooden, carvel-built, keel vessel, with moderately sharp, convex, flaring bow; long floor; rather easy turn to bilge; short full run; square stern; medium sheer; low quarter-deck.

Dimensions of vessel.—Length between perpendiculars, 72 feet 7 inches; beam, 21 feet 1 inch; depth, 7 feet 1 inch; net tonnage. 67.28. Scale of model, one-half inch equals 1 foot.

The *May Queen* is one of several vessels of that class built at Orland and vicinity within a period of 10 or 15 years. These schooners were intended primarily for the Grand Bank codfishery in summer. At other times they often engaged in the coastwise trades. In general, this vessel closely resembled the Gloucester fishing schooners of the same period.

The schooners *Juno* and *Olive Hayward* were built from the same model. The *Juno* made a few codfishing trips to the Banks, and was then sold for the South American trade. The *Olive Hayward* made several fishing trips and then engaged in the coastwise trade. Reputed to be a good sailer, she made the run from Boston to Orland in 16 hours. She escaped when chased by a Confederate privateer.

Gift of H. H. Buck. Cat. No. 76,475 U.S.N.M.

Block model of schooner.

The schooner *Break O'Day* was built from this model at Essex, Mass., in 1859. She had a moderately sharp convex bow; short floor; long, lean run; more than average sheer; square stern, with very much overhang.

Dimensions of vessel.—Length over all, 73 feet; beam, 20 feet 6 inches; depth of hold, 6 feet 10 inches; draft of water aft, 9 feet 6 inches; length of keel, 56 feet 9 inches.

The *Break O'Day* was one of the first vessels built at Essex with overhanging stern. She was employed from Gloucester, Mass., in the summer mackerel fishery, and in winter engaged in the fruit trade between New Orleans and more southern points. At the breaking out of the Rebellion she was captured at New Orleans, while engaged in the fruit trade, and afterwards used in blockade running.

Cat. No. 54,471 U.S.N.M.

Block model of schooner.

The schooner *We're Here*, of Beverly, Mass., was built from this model at Essex, Mass., in 1859. She was specially designed for the Grand Bank codfishery, in which she was employed for many years. This style of vessel is well suited to the bank codfishery, where speed is secondary to safety and large carrying capacity.

She was a wooden, carvel-built, two-masted keel schooner, with moderately sharp bow; rather low floor and high side; medium length of run; square stern; comparatively small drag.

Dimensions of vessel.—Length over all, 68 feet; between perpendiculars, 65 feet; beam, 18 feet; depth of hold, 7 feet; extreme draft, 9 feet; 53.58 net tons. Scale of model, one-half inch equals 1 foot.

The *We're Were* was sold to Maine and used as a small coaster.

Gift of Willard R. Burnham. Cat. No. 54,459 U.S.N.M.

Block model of schooner.

The wooden, two-masted schooner, *Flying Fish*, was built in 1860 at Essex, Mass., from this model. She was a fast sailer, and was employed for several years in the mackerel hook fishery. She was afterwards engaged in the Antarctic fur seal and sea elephant fishery from New London, Conn.

She had a moderately sharp bow; high bilge; long, lean run; wide beam; elliptical, slightly overhanging stern.

Dimensions of vessel.—Length over all, 74 feet; beam, 21 feet; depth of hold, 7 feet; draft of water aft, 9 feet 6 inches. Scale, one-half inch equals 1 foot.

Gift of Jeremiah Burnham. Cat. No. 54,470 U.S.N.M.

Block model of schooner.

The two-masted schooner *Sarah Hill* was built from this model in 40 days at Orland, Me., in 1860. She was a wooden, carvel-built, keel vessel, with moderately sharp convex bow; long head; rather short low floor; lang, well-formed run; square stern; medium sheer; long, low quarter-deck.

Dimensions of vessel.—Length between perpendiculars, 64 feet 1 inch; beam, 18 feet 8½ inches; depth, 7 feet 9½ inches; net tonnage, 48.36. Scale of model, one-half inch equals 1 foot.

The *Sarah Hill* was built for the mackerel fishery, but was soon employed in the bank codfishery, and continued in that until too old, when she was engaged in the coasting trade.

Gift of H. H. Buck. Cat. No. 76,476 U.S.N.M.

Block model of schooner.

The fishing schooner *Laura Roberts* was built from this model about 1862. The *Roberts* was a carvel-built, keel vessel, with moderately sharp, convex, flaring bow; nearly straight, raking stem; long head; long, low floor; short and rather full run; wide elliptical stern; long, low quarter-deck.

Dimensions of vessel.—Length over all, 72 feet; beam, 20 feet; depth, 6 feet; extreme draft, 7 feet 9 inches. Scale of model, one-half inch equals 1 foot. Cat. No. 160,113 U.S.N.M.

Block model of schooner.

The fishing schooner *Galena* of Gloucester, Mass., was built from this model at Essex, Mass., 1863. The schooner *Prince of Wales* was built from the same model in 1864. These were the largest vessels then employed in the Atlantic food-fish fisheries.

The *Galena* had a moderately sharp bow; full body, long run; elliptical, slightly overhanging stern.

Dimensions of vessel.—Length over all, 89 feet; beam, 22 feet 6 inches; depth of hold, 8 feet 3 inches; draft of water aft, 10 feet. Scale of model, one-half inch equals 1 foot.

The *Galena* was employed for several years in the fisheries—chiefly in the summer hook-and-line mackerel fishery—but was then sold to California. The *Prince of Wales*, after having been engaged in fishing for a number of years, varied by freighting in winter, was sold to Surinam, South America. Cat. No. 54,474 U. S. N.M.

Block model of schooner.

A fishing schooner, name unknown, was built from this model in 1864. It was the extreme type of sharp schooner at that date, and, in all essential details of form, continued a representative clipper model until the radical changes in designing fishing craft occurred after 1886.

This vessel had a long, sharp bow; broad beam; long floor verging into a long, lean run; elliptical stern.

Dimensions of vessel.—Length over all, 68 feet; beam, 18 feet; draft of water aft, 7 feet 6 inches. Scale of model, one-half inch equal 1 foot.

Gift of Joseph Story. Cat. No. 54,440 U.S.N.M.

Block model of schooner.

A keel fishing schooner, name unknown, was built from this model at Baltimore about 1865. The model represents the most advanced ideas of Baltimore builders in designing small clipper vessels at that period. It closely resembles some of the Bahaman fishing schooners, and was evidently a swift sailing vessel.

She had a sharp bow; high, rising floor; long, lean run; light, square stern; moderate drag; medium sheer; raking, curved stem; nearly vertical sternpost.

Dimensions of vessel.—Length over all, 61 feet; beam, 18 feet; depth, 7 feet 6 inches. Scale of model, one-half inch equals 1 foot.

Gift of William Skinner & Sons. Cat. No. 76,101 U.S.N.M.

Block model of schooner.

The fishing schooner, *Sylph*, of Boston, Mass., was built from this model in 1865 at East Boston. She was the first vessel ever built in the United States for a beam trawler. She was owned and manned by fishermen of Irish birth who fitted her with a beam trawl, but the attempt to use this form of apparatus proved unsuccessful.

She was a wooden, carvel-built keel vessel; with moderately sharp bow; sharp floor; lean run; heavy elliptical stern; raking curved stem; considerable sheer and heavy drag.

Dimensions of vessel.—Length over all, 59 feet 6 inches: beam, 16 feet; depth, 6 feet. Scale of model, one-half inch equals 1 foot.

The *Sylph* had a good reputation for speed, but foundered on Georges Bank—going down with all her crew—in the furious gale of November 9, 1883. She represents the type of small, wooden, market schooner at the date when she was built.

Gift of D. J. Lawlor. Cat. No. 76,036 U.S.N.M.

Block model of schooner.

The clipper schooner *Helen M. Foster* was built from this model at Scituate, Mass., in 1871 for employment in the deep-sea market fishery from Boston. She was designed by D. J. Lawlor.

She had a sharp bow with wave lines at and below water line; floor slightly concave and with moderate rise; full midship section; long, lean run; flat after section; heavy quarters; broad, deep stern; comparatively little drag; good sheer; curve, moderately raking stem; and nearly square forefoot.

Dimensions of vessel.—Length between perpendiculars, 72 feet; beam, 20 feet; depth, 7 feet. Scale of model, one-half inch equals 1 foot.

Gift of D. J. Lawlor. Cat. No. 76,046 U.S.N.M.

Block model of schooner.

The fishing schooner *Sarah H. Cressy* was built from this model at Chelsea, Mass., in 1866. She was designed by D. J. Lawlor, of Essex, and represents the ideas of that eminent naval architect at that period.

This schooner was a wooden, carvel-built keel vessel, with long sharp bow, with wave lines at and below load-water line; stem nearly vertical, but curved at forefoot; long head; rather sharp floor; quick turn to bilge; wide and large elliptical stern; fine sheer; long, low quarter-deck.

Dimensions of vessels.—Length over all, 76 feet; beam, 20 feet 6 inches; depth, 7 feet. Scale of model, one-half inch equals 1 foot.

The *Cressy* was fairly swift for the period in which she was built, but was wet in a seaway and considered rather unsafe by some. She foundered at sea in February, 1875, while on the fishing banks, going down with all hands in one of the furious gales that swept the western Atlantic during that month.

Gift of D. J. Lawlor. Cat. No. 76,478 U.S.N.M.

Block model of market fishing schooner.

The fishing schooner *Thomas E. Evans* was built from this model at Chelsea, Mass., in 1866 by D. J. Lawlor, who designed her. She engaged in the fisheries only a short time, after which she was employed as a packet in the Bay of Honduras. The model represents the extreme type of market fishing schooners of that date.

The *Evans* has a sharp bow with wave-shaped lines at and below water line; hollow, rising floor; lean run; broad and heavy square stern; nearly vertical sternpost; stem curved slightly and raking but little. She has a good sheer and is specially noticeable for a heavy drag.

Dimensions of vessel.—Length over all, 60 feet; beam, 18 feet; depth, 7 feet 6 inches; draft, aft 10 feet, forward 4 feet 8 inches. Scale of model, one-half inch equals 1 foot.

Gift of D. J. Lawlor. Cat. No. 76,041 U.S.N.M.

Block model of schooner.

The schooner *Lizzie F. Choate*, of Gloucester, Mass., was built from this model at Ipswich, Mass., in 1866, to engage in the mackerel fishery. At that date she was one of the largest and finest schooners employed in the New England fisheries. She carried two topmasts and jib boom, with sails to correspond.

This was a wooden, carvel-built, keel schooner; with sharp bow; raking stem; long head; rising floor; hollow, lean run; broad, heavy square stern; moderate sheer.

Dimensions of vessel.—Length overall, 96 feet; beam, 24 feet 9 inches; depth of hold 8 feet 6 inches; draft, extreme, 10 feet 6 inches. Scale of model, one-third inch equals 1 foot.

The *Choate* engaged in the mackerel fishery in the summers of 1866 and 1867, under the command of Capt. Joseph W. Collins; during the winter of 1866–67 she freighted oysters from the Chesapeake Bay region to Boston, Mass. During the succeeding winter, February 7, 1868, while on a passage from New York to the West Indies, she was lost at sea, together with several of her crew. Three of the men were rescued from the water-logged wreck by the British brig *J. S. Wright*.

She belonged to that class of wide shallow schooners almost universally employed in the New England fisheries between 1860 and 1886, and which were dangerous and unseaworthy when exposed to the fury of heavy gales.

Gift of A. Choate. Cat. No. 160,112 U.S.N.M.

Block model of schooner.

The schooner *Alice G. Wonson* was built from this model at Gloucester, Mass., in 1870. She was designed for the general deep-sea fisheries. Several other schooners were built from the same model.

The *Wonson* was a wooden, carvel-built, clipper, keel schooner, with rather long sharp bow, very slightly concave at and below water line; raking stem; long head; rising floor; quick turn to bilge; long easy run; broad elliptical stern; graceful sheer; long quarter-deck.

Dimensions of vessel.—Length, 76 feet 6 inches; beam, 20 feet 6 inches; depth, 6 feet 9 inches. Scale of model, one-half inch equals 1 foot.

This vessel was at first employed in the summer mackerel and winter halibut fisheries under the command of Capt. Joseph W. Collins. She was an exceptionally swift vessel at the time she was built and sailed especially well to windward. She was exposed to several severe gales, through which she passed in safety, but was finally lost at sea. She was one of the best clipper fishing schooners of the period. Cat. No. 76,477 U.S.N.M.

Block model of schooner.

The fishing schooner *M. E. Torry* was built from this model at Sedgewick, Me., in 1870. She was originally designed for the mackerel fishery, in which she was employed for several seasons. In 1887 she engaged in the Grand Bank codfishery, but was lost on her return trip in the autumn of that year.

The *Torry* resembled the Essex-built fishing schooners of the same period. She was a wooden, carvel-built, schooner rigged, keel vessel, rather wide and shallow, with wide square stern and sharp bow.

Dimensions of vessel.—Length, 71 feet 9½ inches; beam, 21 feet 6 inches; depth, 7 feet $2\frac{4}{10}$ inches. Scale of model, one-half inch equals 1 foot.

Gift of Robert Dority. Cat. No. 76,299 U.S.N.M.

Block model of schooner.

The two-masted schooner *Harvest Home* was built from this model for the Grand Bank codfishery at Lamoine, Me., in 1870.

The *Harvest Home* was a wooden, carvel-built, keel vessel, with sharp bow; rising floor; good run; wide, elliptical stern.

Dimensions of vessel.—Tonnage length, 78 feet; beam, 22 feet 7 inches; depth, 7 feet 7 inches; gross tonnage, 78.28. Scale of model, 1 inch equals 1 foot.

Gift of Newall B. Coolidge & Bros. Cat. No. 76,287 U.S.N.M.

Block model of market-fishing schooner.

The schooner, *Nimbus*, of Gloucester, Mass., was built from this model about 1872. She was designed chiefly for the market fishery, but also represents a numerous class of schooners built about the same date for the Georges codfishery and the mackerel fishery.

This is a clipper model, with long sharp bow, slightly concave at water line; long floor, merging into a long, clean, and finely cut run; elliptical, slightly overhanging stern; broad beam.

Dimensions of vessel.—Length over all, 74 feet; beam, 20 feet; extreme draft, 8 feet. Scale of model, one-half inch equals 1 foot.

This model represents the extreme clipper fishing schooner of moderate dimensions at the date when she was built. She ran on shore in December, 1878, while attempting to enter Cape Negro harbor, Nova Scotia, and two of her crew were drowned.

Cat. No. 57,052 U.S.N.M.

Block model of market-fishing schooner.

The extreme clipper fishing schooner, *David F. Low*, of Gloucester, Mass., was built from this model at that port in 1872, for employment in the deep sea market and mackerel fisheries. She illustrates the highest attainment of that date in designing swift schooners for the ocean fisheries—especially the market and mackerel fisheries—and is an excellent typical representative of the shallow, sharp, broad sterned vessels which proved so unsafe in heavy gales, and of which many were lost by foundering—going down at sea with all hands.

The vessel was a wooden, carvel-built one, with long, sharp bow; lines moderately concave at and below water line; raking stem; long head; sharp, slightly hollow floor; quick turn to bilge; long run with hollow abrupt lines below water, strongly convex water line; overhanging, heavy, wide, elliptical stern; deep keel; graceful sheer. She had a long, low quarter-deck; she carried a heavy rig, and was equipped in the usual style of fishing schooners of that period.

Dimensions of vessel.—Length over all, 79 feet 6 inches; tonnage length, 74 feet; beam, 21 feet; depth, 7 feet; net tonnage, 57.73. Scale of model, one-half inch equals 1 foot.

The *David F. Low* was one of the most extreme sharp vessels of the period when she was built, but, nevertheless, was not remarkably swift. She sat low in the water and her heavy quarters and big stern doubtless prevented her from attaining the speed which her easy entrance might promise.

Gift of Captain E. L. Rowe. Cat. No. 160,111 U.S.N.M.

Block model of schooner.

This model represents the moderately sharp type of wooden seagoing fishing vessel built from 1867 to 1877. More than 30 schooners were built from this model; among them the *Howard*, in 1874, engaged in fishing from Gloucester; the *Carrie Louise*, *Cunard*, *Edward Grover*, *Aberdeen*, and *Nathaniel Webster*.

This model has a moderately sharp bow; full body; long run; elliptical, slightly overhanging stern.

Dimensions of vessel.—Length over all, 72 feet; beam, 20 feet 9 inches; depth of hold, 7 feet 3 inches; length of keel, 62 feet; draft of water aft, 9 feet. Scale of model, one-half inch equals 1 foot.

The *Howard* has been employed in the mackerel hook and seine fisheries, and the bank cod and halibut fisheries; she was the only vessel of the Gloucester fleet that rode out at anchor the severe gale of December 10, 1876. The other vessels built from this model have been engaged in various branches of the sea-fisheries, including the Greenland halibut fishery.

Gift of Willard A. Burnham. Cat. No. 54,456 U.S.N.M.

Block model of schooner.

The schooner *Webster Sanborn*, of Gloucester, Mass., was built from this model at Essex, Mass., in 1876, for employment in the Grand Bank cod and halibut fisheries. Schooners designed especially for bank fishing generally have larger proportional carrying capacity than any other classes of fishing vessels, since speed is more of a secondary consideration. The *Sanborn* is an excellent example of a clipper banker of the period when she was built. She was lost at Newfoundland in the summer of 1882.

The vessel had a moderately sharp, high, rounding bow, somewhat fuller than the average; low, deep bilge; medium length of run; much sheer; elliptical and slightly overhanging stern.

Dimensions of vessel.—Length over all, 81 feet; beam, 24 feet; depth of hold, 8 feet; draft of water aft, 10 feet 6 inches. Scale of model, one-half inch equals 1 foot.

Gift of David Burnham. Cat. No. 54,447 U.S.N.M.

Block model of smack.

The welled fishing schooner *City of Havana* was built from this model at Key West, Fla., in 1877. She was designed for fishing on the shallow grounds along the west coast of Florida, chiefly for red snappers and groupers, which were carried alive in the well to Havana, Cuba, where the Key West smackmen marketed their catch.

The *City of Havana* was a wooden, carvel-built, two-masted keel schooner, with sharp bow; raking stem; long head; rather short rising floor; quick turn to bilge; long and well formed run; strongly raking square stern; good sheer. She had a well amidships for keeping fish alive.

Dimensions of vessel.—Length over all, 61 feet; beam, 18 feet; depth, 6 feet 9 inches. Scale of model, one-half inch equals 1 foot.

After being employed from Key West for a few years the *City of Havana* was sold to Cuba, where she engaged in fishing for the Havana market.

Gift of William J. Albany. Cat. No. 76,084 U.S.N.M.

Block model of schooner.

The schooner *Ivanhoe*, of Gloucester, Mass., was built from this model at that port in 1879. She represents the extreme clipper type of fishing schooner of that period, which was built for the deep-sea food fish fisheries, including those for mackerel, haddock, and fresh halibut.

She was a wooden, carvel-built, keel schooner, with long, sharp bow; moderately concave water lines; raking stem; long head; slightly hollow rising floor; long, very hollow run, with broad, flat, and heavy counters; wide elliptical overhanging stern; fine sheer.

Dimensions of vessel.—Length over all, 87 feet; beam, 22 feet; depth of hold, 8 feet. Scale of model, one-half inch equals 1 foot.

The *Ivanhoe* illustrates the extreme to which designers of clipper fishing vessels went in producing wide, shallow, sharp schooners, with excessively heavy quarters and sterns, and very little displacement—"all cut away underneath." Depending largely on initial stability, and having only inside ballast, commonly stone or gravel, the center of gravity of such vessels was so high that they had no righting power when capsized in a gale by a heavy sea or suddenly knocked down by a squall. Consequently they were exceedingly dangerous, and many foundered in the heavy gales to which they were exposed, going down with all their crews, while others capsized with greater or less fatality. But the form was erroneously considered for speed, and all risks were taken. The building of the United States Bureau of Fisheries schooner *Grampus* demonstrated that a safer vessel might also be swifter; this caused a reaction, and the form was soon abandoned.

Gift of Daniel Poland, jr. Cat. No. 54,444 U.S.N.M.

Block model of market-fishing schooners.

The schooners *John M. Smart*, of Portsmouth, N. H., and *Emma S. Osier*, of Gloucester, Mass., were built from this model at the latter port in 1880, for employment in the shore-market fishery. Vessels of this class, intended for fishing only in inshore grounds, are generally comparatively small. They make short trips and market their catch in a fresh condition. They are designed for swift sailing especially to windward.

These vessels were of extreme clipper build, with long, straight bow; broad beam; high bilge; long, sharp run; broad, elliptical stern, with large overhang.

Dimensions of vessel.—Length over all, 56 feet; beam, 17 feet; draft of water aft, 7 feet; length of keel, 44 feet. Scale of model, one-half inch equals 1 foot.

Gift of John Bishop. Cat. No. 54,454 U.S.N.M.

Block model of clipper schooner.

This model was designed in 1880 by Capt. George M. McClain, of Rockport, Mass., for a mackerel seining schooner of about 180 tons, carpenters' measurement, equal to about 95 or 105 tons, register. It was designed for the special purpose of attaining a high rate of speed but was never copied. It would doubtless have proved a failure and fit for use only in summer fishing.

This was an extreme clipper, with long, sharp, flaring bow; raking stem; sharp hollow floor; lean run; flat counters; elliptical, overhanging stern; strong drag; good sheer.

Dimensions of vessel.—Length over all, 106 feet; beam, 24 feet; draft of water aft, about 10 feet. Scale of model, one-half inch equals 1 foot.

Gift of G. M. McClain. Cat. No. 54,419 U.S.N.M.

Block model of welled vessel.

This model was made in 1883 from a design of Capt. Joseph W. Collins for a welled fishing schooner for the United States Fish Commission, but no vessel was built from it.

The model has a long, sharp, clipper bow; with slightly concave underwater lines; raking, curved stem; long head; sharp, moderately hollow floor; quick turn to bilge; long, lean run; with very hollow abrupt lines under water, and strongly convex; full water line; nearly vertical stern-post; deep, strongly raking elliptical stern, approaching V-shaped in form; symmetrical sheer.

Dimensions of vessel.—Length over all, 78 feet; beam, extreme, 18 feet; depth of hold, 8 feet; draft, aft 10 feet 6 inches, forward 6 feet 6 inches. Scale of model, one-half inch equals 1 foot.

The noticeable features in this design, which may be classed as improvements on fishing vessels constructed at the date when this model was made, are the following: Greater depth to insure a lower center of gravity with inside ballast; slightly easier lines in the after section; more rake to the stern, and having the latter less flat on the counter. The design by United States Naval Constructor Pook (model, No. 160,114) was largely based on this model.

Cat. No. 160,115 U.S.N.M.

Block model of welled fishing schooner.

This model was made in 1883 from designs by Capt. Joseph W. Collins for a welled fishing schooner of about 30 tons for the use of the United States Bureau of Fisheries. No vessel was built from it, the commissioner having subsequently decided to have a larger schooner. It embodies, however, the ideas then held by the designer for improving fishing schooners by increasing their depth and thereby making them safer.

The model was intended for the production of a wooden, carvel-built, keel welled smack, with long, sharp bow; moderately concave at and below water line; raking, curved stem; long head; sharp and very slightly hollow floor; long, lean run, with abruptly curved wave lines below, and strongly convex water line; overhanging strongly raking elliptical stern, which is nearly V-shaped; good sheer; long, quarter-deck.

Dimensions of vessel.—Length over all, 65 feet; beam, 15 feet 6 inches; depth, 8 feet. Scale of model, one-half inch equals 1 foot.

Cat. No. 160,116 U.S.N.M.

Block model of welled fishing schooner.

This model was made in 1883 from a design of United States Naval Constructor S. H. Pook for a welled fishing schooner for the United States Fish Commission. No vessel was built from it.

The model calls for a sharp bow with wave lines under water; sharp hollow floor; long, lean, fine run; overhanging and strongly raking elliptical stern; graceful sheer.

Dimensions of vessel.—Length over all, 78 feet; beam, extreme, 18 feet; depth of hold, 8 feet; extreme draft, 10 feet. Scale of model, one-half inch equals 1 foot.

This model was based on dimensions submitted by Capt. J. W. Collins, and the design was a distinctive improvement in some respects on fishing vessels built at and previous to the date when it was made. This is particularly noticeable in the after section, but the bow is rather too full for high speed—a very requisite qualification in a fishing boat. Cat. No. 160,114 U.S.N.M.

Block model of schooner.

A clipper schooner of about 90 to 100 tons register, designed by Capt. J. W. Collins especially for the offshore bank fisheries.

This was a wooden carvel-built, keel schooner with long, sharp bow; deep body; more than average dead rise; long, lean run; elliptical, overhanging stern, slanting upward from the lower center to the corners; fine sheer; long quarter-deck.

Dimensions of vessel.—Length over all, 85 feet; keel, 69 feet; beam, 21 feet 6 inches; depth of hold, 10 feet; draft, extreme, 10 feet 6 inches. Scale of model, one-half inch equals 1 foot.

A vessel built from this model would be about 2 feet deeper than the typical American fishing schooner of that date and about 1 foot less beam. It is believed that a vessel so constructed would be safer in heavy gales and much swifter than schooners of the ordinary type, which have less body under water. The ballast can, of course, be placed lower and thereby the center of gravity be lowered and the chances of capsizing be much diminished.

Cat. No. 57,051 U.S.N.M.

Block model of schooner.

The wooden fishing schooner *Roulette* of Philadelphia, Pa., was built from this model by her designer, D. J. Lawlor, at Boston, Mass., in 1884. The model represents a material improvement in the form of the New England clipper fishing schooner, it being proportionately deeper than fishing vessels had been previously built. The *Roulette* was made about 18 to 24 inches deeper than it was customary to build fishing schooners at that date, and she was the first of a new type that has since come into great favor. She proved swift and seaworthy, and easily outsailed the shallower vessels, especially in strong winds.

The *Roulette* had a long, sharp bow, moderately convex above and wave-shaped lines at and below water line; sharp floor; short turn to bilge; long, lean run; heavy and rather flat after section, and large elliptical stern. The greatest beam, on deck, is about the center of the length over all. There is considerable sheer. The stem is almost vertical above water, but curves below to meet the keel.

Dimensions of vessel.—Length over all, 92 feet; on load water line, 82 feet; beam, extreme, 23 feet 2¼ inches; depth of hold, 10 feet ½ inch. Scale of model, one-half inch equals 1 foot.

Gift of D. J. Lawlor. Cat. No. 76,034 U.S.N.M.

Block model of schooner.

The schooner, *Nellie Coleman*, was built from this model at Lamoine, Me., in 1883. She was designed and constructed for the Grand Bank codfishery, but was not used for that industry until 1889, previous to which time she was engaged in the general coasting trade. She was a wooden, carvel-built, keel vessel; monerately sharp convex bow; long rising floor; elliptical stern; medium sheer.

Dimensions of vessel.—Length between perpendiculars, 97 feet; beam, 25 feet 8 inches; depth of hold, 9 feet 6 inches; net register tonnage, 152.50. Scale of model, one-half inch equals 1 foot.

Gift of D. D. Hodgkins. Cat. No. 76,289 U.S.N.M.

Block model of market-fishing schooner.

This model was made from a design by Capt. J. W. Collins for a swift, seaworthy schooner of moderate size, to engage in the deep sea market fishery. It shows the most advanced ideas in designing sailing schooners for the fisheries where the maximum of speed and safety are required. It is typically representative of the extreme clipper schooners of the smaller class (50 or 60 tons), built in the last decade of the nineteenth century for prosecuting the market fishery of the Atlantic and Gulf of Mexico.

The model calls for a long, sharp bow, slightly concave at water line; raking stem; small gammon-knee head; sharp floor; easy turn to bilge; long, lean, well-shaped run; narrow, overhanging, V-shaped stern; deep rockered keel; good sheer.

Dimensions of vessel.—Length over all, 84 feet; on load water line, 66 feet; beam, 20 feet 3 inches; molded depth on midship section, 10 feet 4 inches. Scale of model, one-half inch equals 1 foot.

The special characteristics of the model are good depth, which insures a low center of gravity with inside ballast of iron, easy symmetrical lines that give speed, short rockered keel for quick working, and a strong drag line which brings the center of lateral resistance well aft and consequently requires less bowsprit and head sails. Cat. No. 76,279 U.S.N.M.

Block model of three-masted schooner.

The schooner *Lizzie W. Matheson*, of Provincetown, Mass., was built from this model at Essex, Mass., in 1875. She was specially designed for engaging in the dory hand-line codfishery on the Grand Banks of Newfoundland, a business she always followed in summer, though in winter she found employment in the West Indian and coastwise trades.

The *Matheson* was a wooden, carvel-built, keel vessel; broad and rather shallow, with moderately sharp bow; raking stem; long head; long floor, with comparatively little rise; rather short, very hollow run; broad, elliptical stern; good sheer.

Dimensions of vessel.—Length over all, 105 feet; between perpendiculars, 98 feet 9½ inches; beam, 25 feet 6 inches; depth of hold, 10 feet 5 inches; gross tonnage, 193.52. Scale of model, one-half inch equals 1 foot.

This vessel was one of the first, if not the original, three-masted fishing schooner built in New England. Because of her large size and rig she proved quite an innovation. She had a capacity for 5,000 quintals, or 560.000 pounds of codfish. She carried a crew of about 28 or 30 men. A few other three-masted schooners have been built for the New England fisheries, but, as a rule, they have not proved profitable or popular, and a smaller two-masted schooner is generally preferred.

The *Matheson* was lost in the West Indies in 1895.

Deposited by H. & S. Cook. Cat. No. 160,121 U.S.N.M.

Block model of beam trawler.

The ketch or "dandy-rigged" beam trawler *Resolute*, of Gloucester, Mass., was built from this model at Essex, Mass., in 1891. She was designed by Arthur D. Story, who built her for the special purpose of engaging in the beam-trawl fishery off the coast of New England. She was the first vessel of this type built in America, and resembled in form, equipment, and rig, the first-class sailing beam-trawlers of the east coast of England. After making a number of trips, she abandoned beam trawling.

The *Resolute* was a wooden, carvel-built, keel vessel; with sharp bow; plumb stern; sharp floor; easy run; overhanging, square stern; good sheer; flush deck.

Dimensions of vessel.—Length, 85.4 feet; beam, 22 feet; depth of hold, 9.6 feet; net tonnage, 95.52. Scale of model, one-half inch equals 1 foot.

This vessel caught large quantities of flat fish in her beam trawl, but the low price for such species, together with the misfortune of losing or injuring the trawl on several occasions, caused the abandonment of the experiment of beam trawling in the Western Atlantic.

Gift of A. D. Story. Cat. No. 76,288 U.S.N.M.

Block model of schooner.

The centerboard schooner *Breeze* was built from this model at Baltimore in 1855 for the oyster trade in the Chesapeake and its tributaries. Her large beam and shallowness are noticeable features, which were characteristic of many of the oyster schooners of that date, large deck room and a light draught being requisite.

The *Breeze* had a moderately sharp, convex bow; long, rather flat floor; round, easy bilge; long, lean run; light, square stern; very little drag; straight on top.

Dimensions of vessel.—Length, 60 feet; beam, 19 feet 6 inches; depth of hold, 5 feet. Scale of model, one-half inch equals 1 foot.

Gift of William Skinner & Sons. Cat. No. 76,097 U.S.N.M.

Block model of bugeye.

The schooner-rigged "bugeye," *Lillie Sterling*, of Cristfield, Md., was built from this model in 1885. She is typically representative of the canoe-shaped craft known as bugeyes, which are extensively employed in the oyster fishery of the Chesapeake Bay region. The model represents a wooden, carvel-built, centerboard vessel; sharp forward and aft; rather flat floor; round bilge; raking stem and sternpost; long head; rudder hung outside; good sheer; flush deck.

Dimensions of vessel.—Length over all, 45 feet; beam, 13 feet 6 inches; molded depth, 3 feet 9 inches. Scale of model, one-half inch equals 1 foot.

Gift of E. James Tull. Cat. No. 76,290 U.S.N.M.

Block model of oyster schooner.

The two-masted schooner, *Sunny South*, was built from this model at Baltimore, Md., in 1855. She was specially designed for the oyster fishery, with particular reference to carrying oysters from the fishing grounds to Baltimore. She is of the type of small freighting schooners called "Bay boats," of which there is a large number employed on Chesapeake Bay and its tributaries.

The *Sunny South* was a wooden, carvel-built, keel vessel, with sharp bow; slightly raking stem; long head; rising floor; long, well formed run; wide, square stern; moderate sheer; long, low quarter deck.

Dimensions of vessel.—Length over all, 75 feet, between perpendiculars 71 feet; beam, 22 feet; depth of hold, 5 feet; 80 tons, old measurement. Scale of model, one-half inch equals 1 foot.

Gift of William Skinner & Sons. Cat. No. 76,096 U.S.N.M.

Model of carry-away sloop.

This represents a class of small, shallow, centerboard, yacht-like sloops more or less extensively employed in carrying menhaden from the "sailing gangs" on the fishing grounds to the factories of the Long Island Sound region. Since 1885 these have been largely—in some sections entirely—superseded by steamers, which carry their own catch, and have driven the "sailing gangs" out of the fishery.

This is a wooden, carvel-built, centerboard, sloop-rigged craft; with sharp bow; broad beam; light draft; rather flat floor; fine run; square stern; decked, with large covered hatchway amidships, 14 feet long, 8 feet wide, cabin trunk aft.

Dimensions of vessels.—Length over all, 43 feet 6 inches; beam, 14 feet; draft of water aft, without centerboard, 3 feet 6 inches; mainmast, above deck, 45 feet 6 inches; bowsprit, outside, 15 feet; topmast, 22 feet 6 inches; main boom, 44 feet; main gaff, 21 feet. Skiff boat attached—flat bottom, sharpy pattern—11 feet 9 inches long, 4 feet wide. Scale of model, one-half inch equals 1 foot.

When a school of menhaden is caught in a purse seine the sloop is laid alongside the net and the fish are bailed into the vessel's hold until she is filled. If the catch is large enough, she sails away for the factory. Cat. No. 57,029 U.S.N.M.

Block model of welled fishing boat.

The sloop *Manhattan* was built from this model in 1854 for employment in the market fisheries from Connecticut. It represents the most advanced ideas at that date in designing sloop-rigged vessels for the fisheries in southern New England. Practically without exception these vessels had wells for keeping fish and lobsters alive.

The *Manhattan* was a wooden, carvel-built, keel vessel, with moderately sharp bow; raking stem; sharp floor; long, lean run; heavy square stern; very slight after overhang; good sheer. As a rule vessels of this class had rather high quarter-decks, with open quarter rails.

Dimensions of vessel.—Length over all, 47 feet; beam, 16 feet 6 inches; molded depth, 6 feet. Scale of model, one-half inch equals 1 foot.

For many years sloops were in special favor among the fishermen of Connecticut, and nearly all the smaller vessels had this rig. The sloop sailed much better than the schooner and generally only the larger vessels engaging in the mackerel and halibut fisheries were schooner rigged. Before the use of ice for refrigeration of fish on vessels became common, the wells made it possible to carry fish alive to the New York market, where good prices were realized. By the latter part of the nineteenth century these sloop smacks had been nearly superseded by tight-bottomed schooners, but some are still in use.

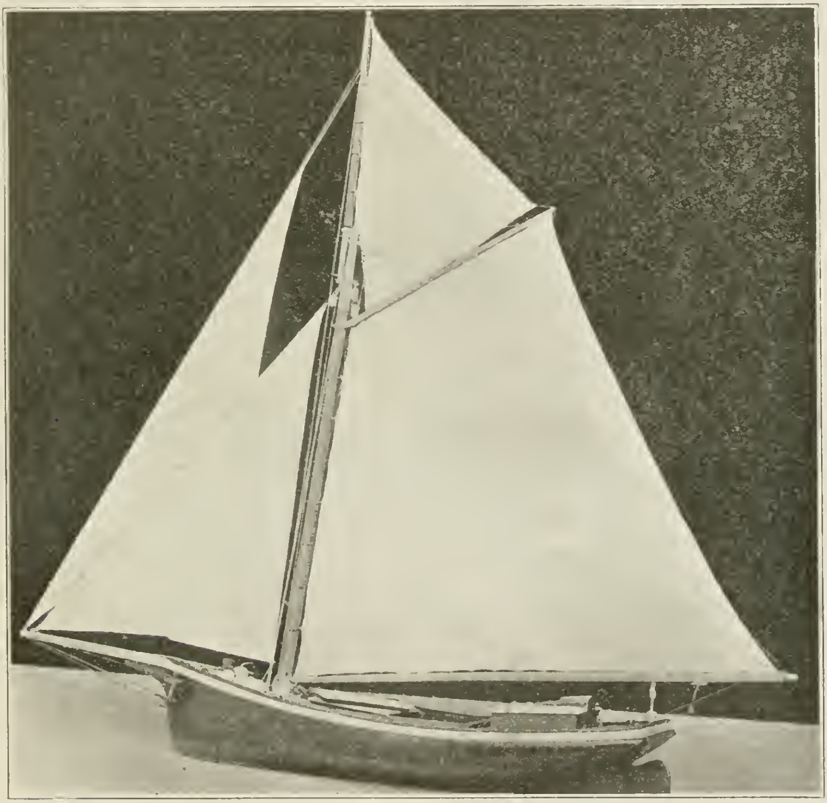


FIG. 48.—LONG ISLAND CARRY-AWAY SLOOP.

Gift of L. D. Ashby. Cat. No. 160,118 U.S.N.M.

Model of fishing boat.

Boats of this type are quite generally used in various fisheries along the coast of Maine, but are in special favor at Monhegan Island, and to a somewhat less extent at Boothbay and vicinity. In form of hull, build, and some other details they resemble the Matinicus boats, from which they differ chiefly in rig. They are reputed to be swift and seaworthy.

This vessel is schooner rigged; with two spritsails (mainsail and foresail) and jib; open; washboards; centerboard; two thwarts; seat around stern cockpit; platform over ballast; fish kid amidships, separated from forward and after standing rooms by bulkheads; two masts. The boat has a sharp yacht-like bow; high bilge; fine clean run; elliptical stern, with considerable overhang; small keel; stem nearly straight above water line, sharply curved below. Fitted with one pair of oars and rowlocks and one fishing line; anchor hanging to bowsprit.

Dimensions of boat.—Length over all, 20 feet 6 inches; beam, 6 feet; draft, 2 feet 9 inches; mainmast, above thwart, 13 feet 6 inches; foremast, above thwart, 19 feet; bowsprit, outside, 5 feet; main boom, 9 feet. Scale, 1 inch equals 1 foot.

Cat. No. 57,031 U.S.N.M.

Model of two-masted catboat.

This model represents a class of boats extensively used in the general shore fisheries, especially in the lobster fishery in northern New England. They are usually good sailers and sea boats, are easily managed, and vary from 18 to 25 feet in length. The specifications call a wooden, carvel-built, keel, cat-rigged boat; with sharp bow; broad beam; open, square stern; fine run; washboards; partly decked fore and aft; deep keel; two masts; two spritsails.

Dimensions of boat.—Length over all, 19 feet; beam, 6 feet 6 inches; width of stern, 3 feet 9 inches; foremast, above deck, 13 feet 6 inches; mainmast, 12 feet 9 inches. Scale of model, 1 inch equals 1 foot.

Gift of Johnson & Young. Cat. No. 26,585 U.S.N.M.

Model of welled fishing sloop.

This model was made from a design by Capt. J. W. Collins for an improved form of welled fishing boat for use in the shore fisheries of the Pacific coast. The object of the design was to produce a swift, seaworthy sloop of moderate dimensions provided with a well for taking fish alive to the market—a matter of much consequence along the Pacific coast, where ice is scarce and expensive. Boats of this class could be used to advantage in the fisheries of Key West and other southern ports.

The model represents a carvel-built, keel boat, with sharp bow; stem straight above water and curved below; sharp floor; rockered keel; fine run; long tapering overhang and small V-shaped stern; good sheer; flush deck; cuddy forward; steersman cockpit aft; "box well" amidships. Sloop rigged, with housing topmast, and jib set flying.

Dimensions of vessel.—Length over all, 34 feet 3 inches; load water line, 28 feet 2½ inches; beam, 10 feet 9¾ inches; depth, 6 feet; draft, extreme, 5 feet ½ inch; length of well, extreme, 8 feet; length of well at deck, 3 feet; width of well, extreme, 5 feet; width of well at deck, 2 feet; mast, deck to hounds, 22 feet 9 inches; masthead, 4 feet 6 inches; topmost, heel to truck, 22 feet; boom, 30 feet 6 inches; gaff, 20 feet; bowsprit, outside stem, 14 feet 6 inches. Scale of model, 1 inch equals 1 foot.

In 1894 a sloop was built from this design by Lawrence Jensen at Gloucester, Mass., but without the well. This little vessel was named the *Sparrow Hawk*. She had inside ballast only, being intended for fishing and, incidentally, for carrying pleasure parties. At the close of the season, during which she had shown considerable speed, she was purchased by a yachtsman, fitted with a metal keel and loftier rig, and transformed into a yacht.

Deposited by the Bureau of Fisheries. Cat. No. 76,268 U.S.N.M.

Model of fishing cutter.

Boats of the class represented by this model were used quite extensively by the Irish fishermen sailing from Boston, Mass. This particular type was first introduced into the United States about 1857. It is essentially the same as the boats used on the coast of Ireland at Galway, and known as the "Galway hooker." The model has been much improved by the Boston builders, and some of these boats have become very celebrated for speed, so much so that they have been purchased by wealthy gentlemen and converted into yachts. They are reputed to be very seaworthy, and almost any time, even in midwinter, they may be seen in Massachusetts Bay shooting or hauling their lines and nets.

This model has a sharp bow; high floor; clean run; moderate sheer; deep keel; stem straight above water line, curved below; much drag line; deep, square, heart-shaped stern; raking sternpost; rudder hung outside; decked forward a little less than half the length, rest open; cockpit aft; middle portion bulkheaded off for fish, and generally provided with temporary covering of boards; four thwarts; cutter-rigged, with running bowsprit; three sails, mainsail, stay foresail, and jib.

Dimensions of boat.—Length over all, 36 feet; keel, 29 feet; beam, 9 feet 3 inches; draft, forward 2 feet 9 inches, aft 5 feet 8 inches;

mast, above deck, 34 feet 9 inches; bowsprit, outside, 10 feet 6 inches; main boom, 32 feet 6 inches; gaff, 21 feet 3 inches. Scale of model, 1 inch equals 1 foot.

Patrick Gannon, formerly of Galway, Ireland, had constructed for his own use in 1857 the first of the Irish market cutters ever built in this country. Cat. No. 57,131 U.S.N.M.

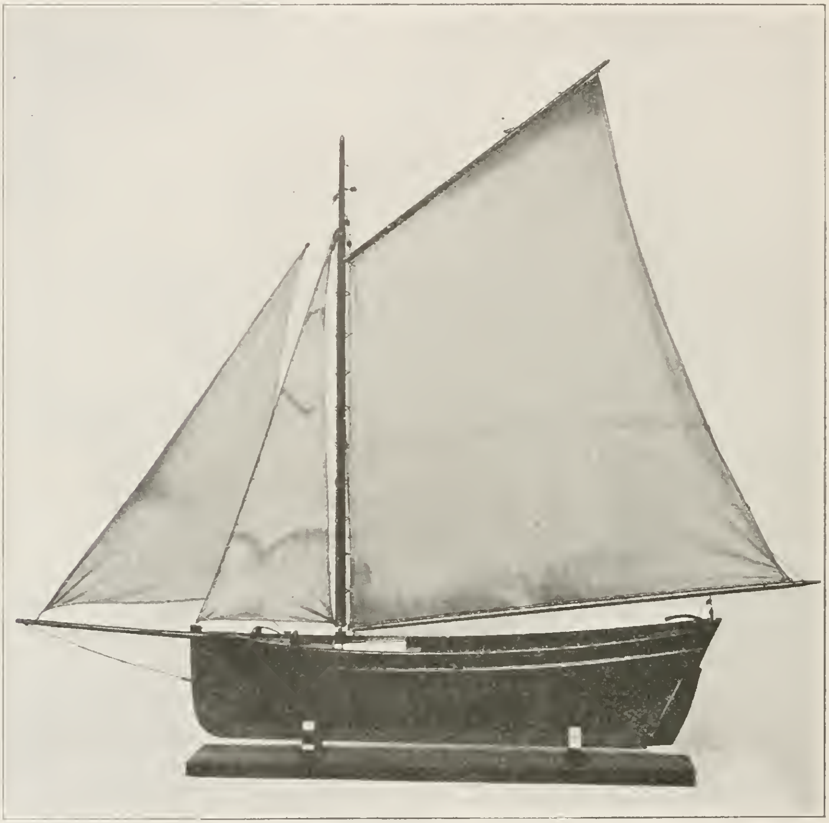


FIG. 49.—BOSTON FISHING CUTTER.

Model of lobster boat.

Boats of this type are used chiefly in the lobster fishery of Long Island Sound, particularly at Noank and New London, Conn., and vicinity. They appear to have originated at Noank, where they are in special favor. The well is for the purpose of keeping lobsters alive.

This is a wooden, carvel-built centerboard sloop; partly decked forward and aft with washboards inclosing an elliptical-shaped open space. She has a broad beam; sharp bow; rising floor; flaring side; fine run, with skag, wide V-shaped raking stern. Open well for fish, with perforated bottom, each side of centerboard case. Carries jib and mainsail.

Dimensions of boat.—Length over all, 24 feet 6 inches; beam, 10 feet 6 inches; width of stern, 7 feet 6 inches; depth, top of gunwale amidships to top of keel, 4 feet 9 inches; bowsprit, outside of stem, 9 feet; mast, above deck, 26 feet 6 inches. Scale of model, 1 inch equals 1 foot.

Boats of this class are swift and able under sail. They are easily managed by one man, and seem well adapted to the fishery in which they are chiefly employed.

Gift of Capt. H. C. Chester. Cat. No. 26,809 U.S.N.M.

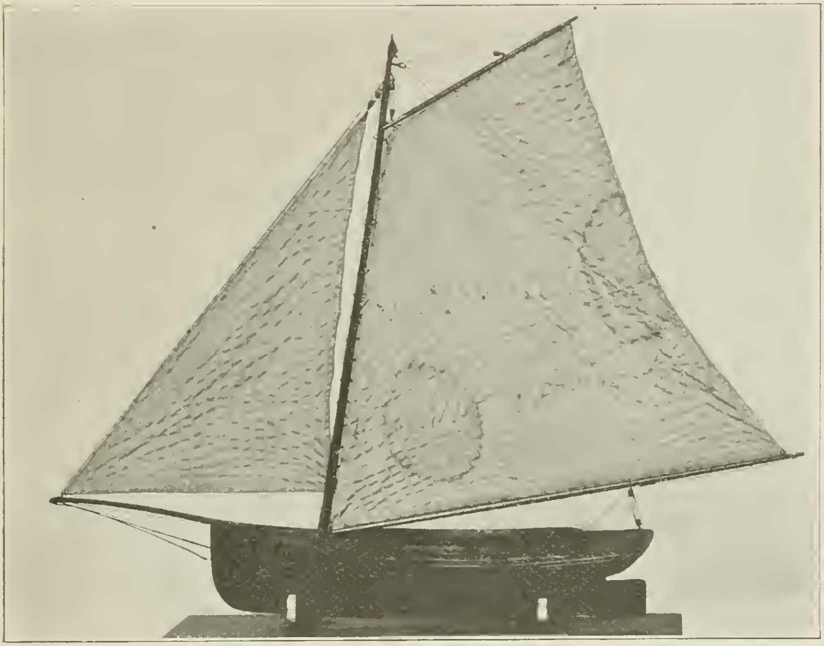


FIG. 50.—NOANK CENTERBOARD SLOOP.

Model of lobster boat.

This model represents a class of sloop-rigged boats in general use at Muscongus Bay, Me. They are employed in the general fisheries of the coast, but have been found exceedingly well adapted for the lobster fishery, for which they are specially designed. They are remarkably good sailers, fine sea boats, and perfectly manageable without jib.

This is a wooden, carvel-built, centerboard, open, sloop-rigged boat; long, sharp bow; broad beam; moderately sharp floor; fine run; overhanging, square stern; short deck forward, under it a cuddy for crew's sleeping quarters and also for storage of lobsters in cold weather; washboards on each side aft of cuddy, inclosing open space for standing room, and for stowage of barrels, etc., when cod or mackerel fishing.

Dimensions of boat.—Length 26 feet; beam, 8 feet; mast, 25½ feet (above deck); bowsprit, 6 feet (outside); main boom, 25¾ feet; gaff, 15 feet. Scale of model, 1 inch equals 1 foot.

Deposited by the Bureau of Fisheries. Cat. No. 55,795 U.S.N.M.

Model of Matinicus Island boat.

This type of boat is used in the general fisheries along the coast of Maine, but most universally at Matinicus Island, Me., where it originated. Boats of this class are swift sailers and well adapted to the work in which they are employed.

The model represents a wooden, carvel-built, open, centerboard, sloop-rigged boat; very sharp, yacht-like bow; straight stem above water line, much curved below; high bilge; fine, clean run; elliptical stern, like clipper schooner; some overhang; washboards; one pair rowlocks aft; two thwarts; seat around stern cockpit; ballast platformed down; fish kid in center of boat; bulkheaded; sprit, mainsail and jib; one pair of oars; little punt attached.

Dimensions of boat.—Length over all, 21 feet; beam, 6¼ feet; depth, 3½ feet; draft, 3 feet. Spars: Bowsprit, outboard, 5½ feet; mast, 20½ feet (total); sprit, 16 feet. Scale of model, 1 inch equals 1 foot. Many boats of this type are clinker built.

Cat. No. 57,032 U.S.N.M.

Model of sponge sloop.

The sloop-rigged boat, of which this is a miniature, was built at Key West, Fla., in 1880, for employment in the sponge fishery from that port. She is typically representative of a class of boats that are somewhat numerously engaged in fishing for sponges along the reefs of Florida, especially in the vicinity of the Keys.

Specifications call for a wooden, carvel-built, centerboard boat, with sharp bow; rising floor; long run and skag; broad, square stern; good sheer; partially decked, with large elliptical-shaped cockpit; sloop rigged, with a large area of sail.

Dimensions of boat.—Length, over all, 24 feet; beam, 10 feet 3 inches; molded depth, 2 feet 6 inches; mainmast, above deck, 27 feet 6 inches; topmast, heel to truck, 11 feet 9 inches; bowsprit, outside, 12 feet; main boom, 26 feet 6 inches; main gaff, 12 feet 9 inches. Scale of model, 1 inch equals 1 foot.

This boat resembles in form and rig the small sloops used for fishing or pleasure on the coast of New England and the Middle Atlantic States.

Deposited by the Bureau of Fisheries. Cat. No. 76,251 U.S.N.M.

Model of smackee.

The welled fishing boat *Jeff Brown*, of Key West, Fla., of which this is a miniature, was built for the market fishery at that port in 1883. Boats of this type are called "smackees"; a variation of the term smack, as applied to welled vessels. They are employed in considerable numbers at Key West, and are noticeable for having the "Mudian rig"—a leg-of-mutton mainsail and jib—and also a well in which the fish are kept alive.

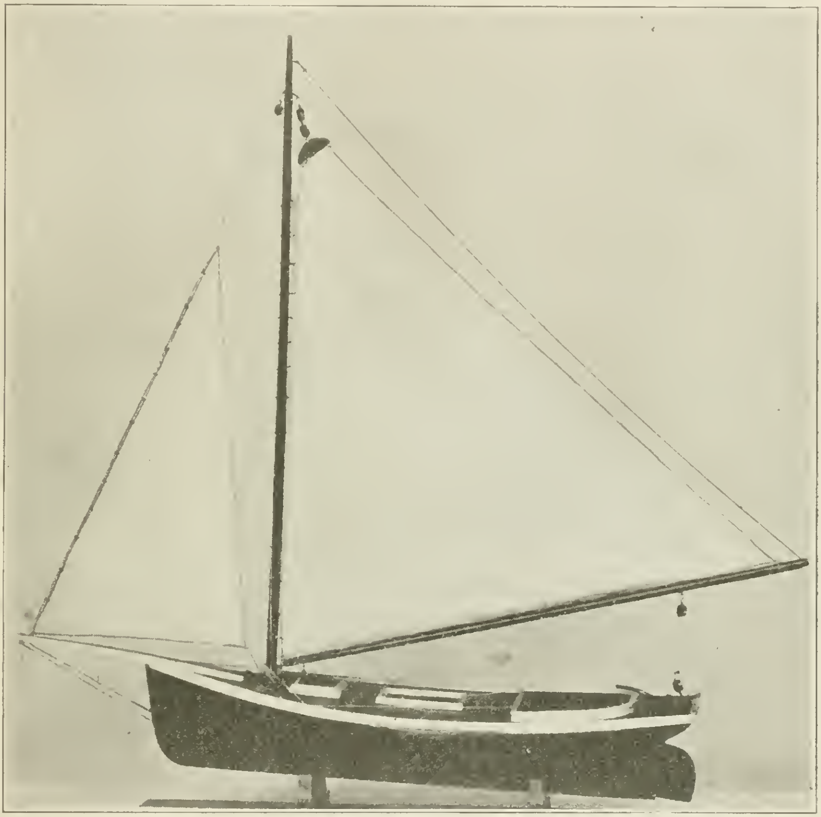


FIG. 51.—KEY WEST SMACKEE "JEFF BROWN."

A wooden, carvel-built, sloop-rigged keel boat, with good sheer; sharp bow; rising floor; long run, and skag; V-shaped, raking stern; cockpit aft; well amidships; cuddy hatch forward; mast stepped well forward; short bowsprit.

Dimensions of boat.—Length over all, 24 feet; beam, 8 feet 3 inches; molded depth, 3 feet; mast, above deck, 32 feet; bowsprit, outside, 6 feet; main boom, 23 feet. Scale of model, 1 inch equals 1 foot.

The majority of the Key West smackees are slightly smaller than the *Jeff Brown*, and differ from the latter in having square vertical sterns with their rudders hung outside. They sail well and are reputed to be seaworthy and able in strong winds.

Deposited by the Bureau of Fisheries. Cat. No. 76,258 U.S.N.M.

Model of lugger.

The model represents a type of single-masted lug-rigged boat extensively employed in coast fisheries of the Gulf of Mexico, from New Orleans, La., and adjacent localities. Boats of this form are distinctly European in origin; they are built and manned chiefly by Italians or other natives of southern Europe.

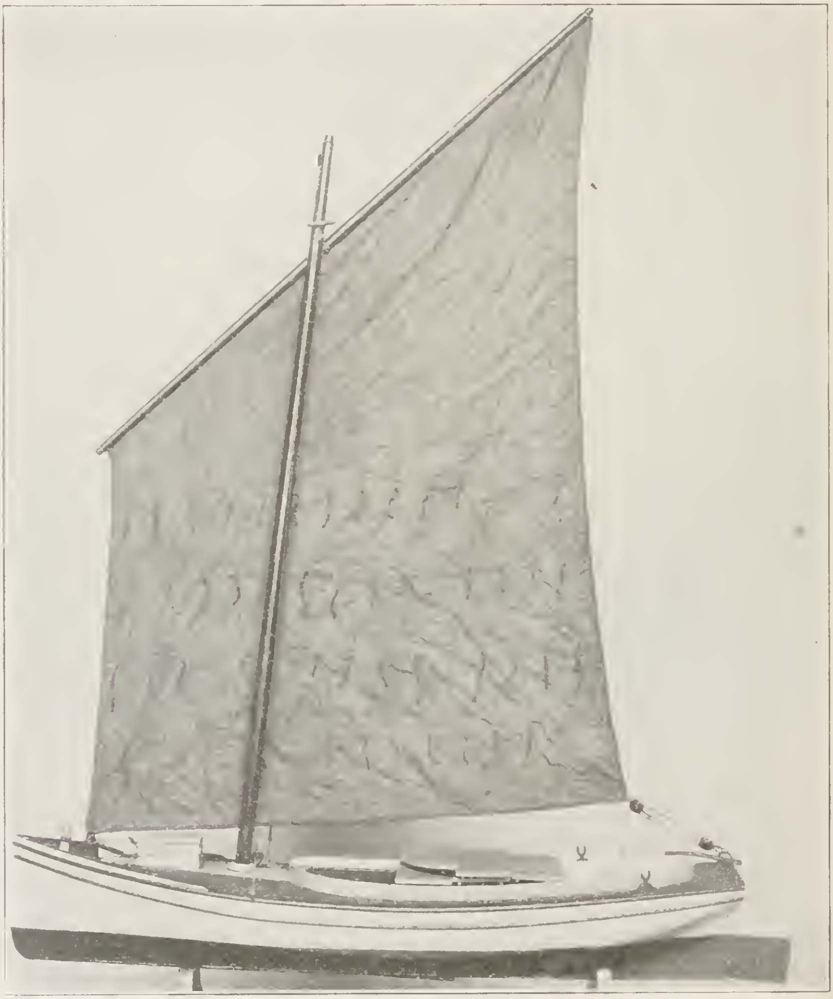


FIG. 52.—NEW ORLEANS LUGGER.

This is a wooden, carvel-built, centerboard boat, half deck forward, with wide washboards and high coaming around the elliptical-shaped cockpit, the latter being provided with hatches to cover about two-thirds of its length from the forward part. The cuddy forward is entered through an opening in front of the mast. The bow is sharp, with concave water line, straight stem, very shallow keel, moderate rise to floor with quick turn to bilge, medium length of run. V-shaped square stern with no overhand to counter; rudder hung outside and moved by tiller.

The rig consists of a single mast abaft; on this is set a single large, loose-footed lug sail, which tacks down to an iron traveler near the stem, while the sheet trims to an iron traveler that extends from side to side of the stern. The sail is not dipped when making short tacks in beating to windward.

Dimensions of boat.—Length over all, 40 feet 6 inches; lower water line, 39 feet 9 inches; beam, 12 feet 6 inches; depth, amidships, keel to top of gunwale, 4 feet 9 inches; draft, aft, 2 feet 9 inches; length of mast, extreme, 45 feet; yard, 38 feet 6 inches. Scale of model, 1 inch equals 1 foot.

Boats such as these are not used in the United States except on the Gulf coast, and are restricted there chiefly to Louisiana. They are celebrated for speed and are reputed to be well adapted to the shallow, narrow waters in which they have to work. The size varies from about 18 to upward of 40 feet in length.

When beating to windward the sail is not shifted to leeward of the mast as is ordinarily done with a dipping lugsail. It is trimmed very flat and the boat sails close to the wind with the sail on the weather side of the mast.

Deposited by the Bureau of Fisheries. Cat. No. 76,267 U.S.N.M.

FISHING BOATS.

Model of cat-rigged fishing boat.

These boats are used in lobster and hook-and-line fisheries; they vary in length, on the keel, from 14 to 19½ feet and are provided with a well in which to keep alive lobsters and fish.

A wooden, clinker-built, keel, cat-rigged boat, carrying a single boom and gaff sail; open; sharp bow; broad beam; square stern; floored in cockpit and forward compartment; between these is a fish well pierced with holes in bottom.

Dimensions of boat.—Length over all, 20 feet 3 inches; on keel, 17 feet 6 inches; beam, 8 feet; mast, 22 feet 9 inches. Scale of model, 1 inch equals 1 foot.

Gift of J. M. K. Southwick. Cat. No. 29,537 U.S.N.M.

Model of catboat.

The type of boat represented by this model is extensively employed in the general fisheries at Marthas Vineyard, Mass., at Nantucket, Woods Hole, Falmouth, and elsewhere in the vicinity. It is also in great favor for pleasure purposes and, in addition to being largely adopted as a yacht, many of the fishing "cats" are used in summer for taking out parties of pleasure seekers. They are swift in smooth water; stiff, and well adapted to service at many points, especially in those localities where shallow water prevails.

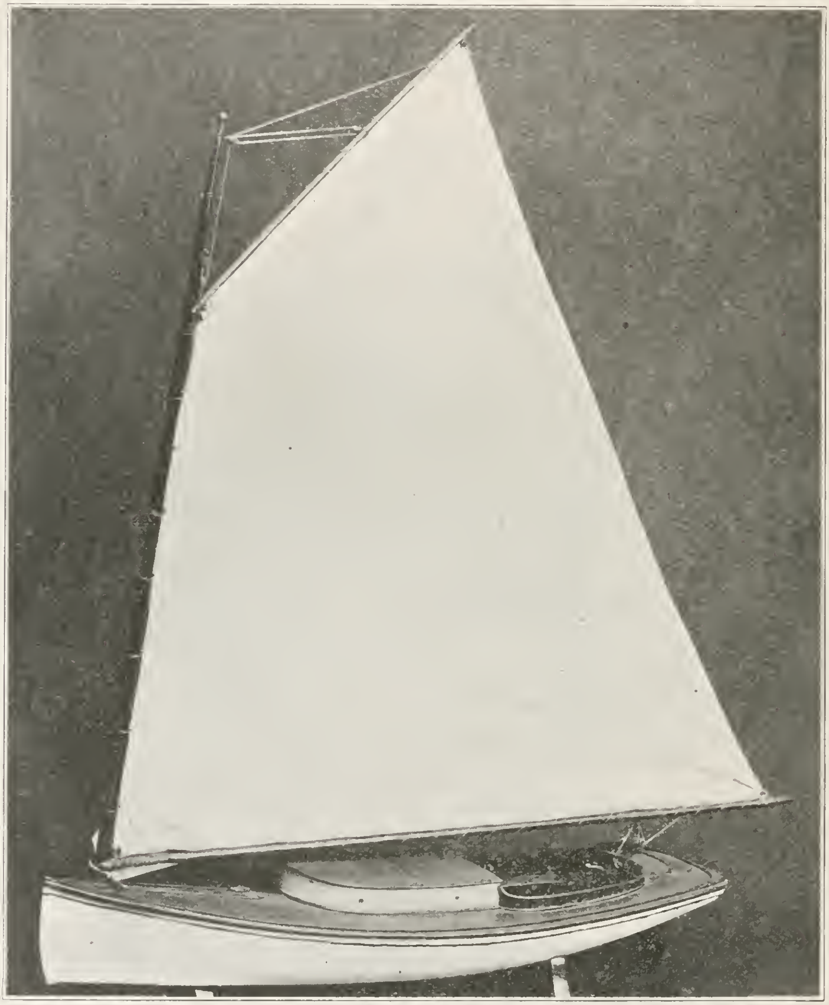


FIG. 53.—MARTHAS VINEYARD CATBOAT.

This is a wooden, carvel-built, centerboard boat, with long, sharp bow; broad beam; wide V-shaped stern: decked forward to form a cuddy or cabin; cockpit aft of cabin with seats around it; washboards around cockpit; mast stepped close to stem; one large boom and gaff sail.

Dimensions of boat.—Length over all, 19 feet 9 inches; beam, 7 feet 6 inches; depth, amidships, gunwale to top of keel, 3 feet; mast, above deck, 19 feet 6 inches; boom, 22 feet; gaff, 11 feet. Scale of model, 1 inch equals 1 foot.

Gift of William H. Chase, jr. Cat. No. 25,026 U.S.N.M.

Model of cat-rigged water boat.

This is one of the cat-rigged sailboats which supply the fishing vessels with fresh water at Gloucester, Mass. The water tank in which the supply of fresh water is kept, occupies about two-thirds of the boat's central length under deck.

Sharp bow; broad beam; round stern; comparatively light draft; decked; with cockpit for steersman aft; pump and hose; hatchway to water tank nearly amidships; hatchway to forehold on port side forward; keel; one large boom and gaff sail.

Dimensions of boat.—Length over all, 37 feet; beam, 12 feet; length of mast, above deck, 39 feet; main boom, 37 feet; gaff, 16 feet; Scale of model, 1 inch equals 1 foot.

Deposited by the Bureau of Fisheries. Cat. No. 56.937 U.S.N.M.

Model of double-ender or "pea pod."

This model (built at Jonesport, Me.) represents a class of boats used in the general fisheries of the coasts of Maine, but chiefly employed in the lobster fishery in certain localities, the shape of the boat making it unnecessary for the fishermen to turn it around, since it can be rowed one way as well as the other.

This is an open, clinker-built, keel boat; sharp forward and aft; both ends alike; curved stem and sternpost; rising floor; round bilge; good sheer; cat rigged with single sprit sail. Has rudder; two oars and two thwarts.

Dimensions of boat.—Length over all, 15 feet; beam, 4½ feet; depth, 1½ feet; mast, 14 feet; boom, 14 feet; gaff, 6 feet. Scale of model, 1 inch equals 1 foot. Cat. No. 56.864 U.S.N.M.

Model of Reach-boat.

This model represents the typical "Reach-boat" which is extensively employed in the general fisheries of eastern Maine. The average length of these boats is 15 feet, though they are often built more than 20 feet long. The distinctive name, "Reach-boat," is derived from Moose-a-bec Reach (Jonesport), Me., where this type is supposed to have originally been built on that coast. The name is also applied to clinker-built, square-sterned boats.

This is a wooden, clinker-built, open, keel boat; sharp at both ends; curved stem; straight sternpost; cat-rigged, carrying a single spritsail; has one pair of oars and two thwarts.

Dimensions of boat.—Length, 15 feet; beam, 4¾ feet; mast, above thwart, 11½ feet. Scale of model, 1 inch equals 1 foot.

Cat. No. 57,561 U.S.N.M.

Model of salmon boat.

Universally used in the salmon gill-net fishery near the mouth of the Columbia River. Most of these boats are owned at Astoria, Oregon.

A wooden, carvel-built, double-ended, open boat; bow and stern rather strongly convex above, sharper with hollow lines below; considerable rise to floor; easy bilge; straight and nearly vertical stem and sternpost; moderate sheer; washboards along the sides; deck for 2 or 3 feet at either end; four thwarts; carries a single spritsail on mast stepped well forward.

Dimensions of boat.—Length over all, 25 feet 9 inches; beam, 6 feet 9 inches; height amidships, 2 feet 6 inches; at ends, 3 feet; mast, 16 feet 3 inches long; oars, 12 feet long. Scale of model, 1 inch equals 1 foot.

The first boat of this kind used on the Columbia River was built at San Francisco, Calif., in 1869. At first the ordinary length was 22 or 23 feet, and usually they had no washboards. Later, boats 25 and 26 feet in length were built, but were found to be rather unwieldly for two men to manage. At present the size ranges from 23 to 28 feet in length, though the majority do not exceed 24 feet.

This type of boat was first used on the Sacramento River, the original boat being built in May, 1868. The Sacramento boats range in size from 15 to 25 feet in length. They usually carry a single leg-of-mutton sail, but on the Columbia the spritsail is in favor.

Cat. No. 22,216 U.S.N.M.

Block model of sponge sloop.

The sloop-rigged boat *Terror* was built from this model at Key West, Fla., to engage in the sponge fishery on the reefs between the Florida Keys.

A wooden, carvel-built, centerboard boat; wide and shallow, in form resembling the small centerboard sloop-yachts of the Atlantic coast of the United States; long, sharp, nonflaring bow; stem straight and nearly vertical above water, curved below; rising floor; medium length of run, with skag; wide rudder; raking V-shaped stern; moderate sheer.

Dimensions of boat.—Length over all, 24 feet; beam, 9 feet 4 inches; depth, 2 feet 8 inches. Scale of model, three-fourths inch equals 1 foot.

Gift of Lawrence Higgs. Cat. No. 76,087 U.S.N.M.

Block model of welled fishing sloop.

The sloop-rigged smackee *Jeff Brown* was built from this model at Key West, Fla., in 1883. She had a well amidships for keeping fish alive, hence the typical name "smackee," which means a small smack in the vernacular of the Key West fisherman.

A wooden, carvel-built, welled boat, with sharp bow and floor; long run with skag; V-shaped raking stern; good sheer.

Dimensions of boat.—Length over all, 24 feet; beam, 8 feet 3 inches; molded depth, 3 feet. Scale of model, 1 inch equals 1 foot.

Cat. No. 76,083 U.S.N.M.

Model of seine boat.

Used in the shad fisheries of the Potomac River for "laying out" the drag seines. It carries 1,200 to 1,500 fathoms of seine, which is 30 feet deep on the channel end, 12 feet deep on the shore end. Mesh 2½ to 3 inches. Rowed by 24 oars double-banked and 2 single-banked forward.

An open, long, narrow rowboat; sharp bow; curved stem; keel; wide and full square stern; round bilge; slight sheer. Braced longitudinally with "hogrod" to prevent the keelson springing up amidships.

Dimensions of boat.—Length, 72 feet; beam, 12 feet; height, amidships, 5 feet 9 inches. Scale of model, one-half inch equals 1 foot.

Deposited by the Bureau of Fisheries. Cat. No. 55,877 U.S.N.M.

Model of yawl boat.

A type of boat much used by coasting vessels; and also by fishing vessels prior to 1870, since which time it has been superseded by the "dory." It is carried at the stern, where it is hoisted to davits. As a rule, it is propelled only by oars, but occasionally is fitted with sails.

A wooden, carvel-built, open, keel boat, with sharp flaring bow; curved stem; moderate rise to floor; easy bilge, medium length of run, partially formed by skag; wide heart-shaped square stern; rudder hung outside and worked by wooden yoke; five thwarts and stern seats; flat wooden tholes. Fitted with Lieutenant Wood's detaching apparatus.

Dimensions of boat.—Length, 20 feet; beam, 6 feet; depth, 2 feet 6 inches. Scale of model, 2 inches equal 1 foot.

Gift of Cragin and Sheldon. Cat. No. 25,000 U.S.N.M.

Model of fishing boat.

A peculiar type of sharp-ended boat used in the fisheries from Block Island, R. I.

A wooden, clinker-built, open, keel boat, with sharp bow and stern; very sharp floor (the boat being nearly V-shaped in cross section): flaring side; raking stem and sternpost: upright washboards on sides for about two-thirds of boat's length; two-masted cat rig, with loose-footed gaff foresail and boom and gaff mainsail; sails remarkable for narrow heads and much hoist.

Dimensions of boat.—Length over all, 33 feet; beam, extreme, 13 feet; depth (exclusive of washboards, which are 1 foot high), 4 feet 6 inches; foremast, above gunwale, 34 feet 3 inches; fore gaff, 5 feet; mainmast, above gunwale, 22 feet 6 inches: main gaff, 4 feet 3 inches; main boom, 19 feet 8 inches. Scale of model, one-half inch equals 1 foot.

There are no harbors at Block Island, and these boats are launched through the surf and landed on the open beach on their return. They are swift and exceedingly seaworthy. In only a single instance is it known that one of these boats has been lost.

Made and presented by H. C. Chester. Cat. No. 25,825 U.S.N.M.

Model of fishing boat.

Used in the general shore fisheries from No Mans Land, Mass., and vicinity. The principal fisheries of No Mans Land are those pursued for the capture of cod and lobsters.

A wooden, clinker-built, open, keel boat; sharp forward and aft; rising floor; raking curved stem; raking straight sternpost; good sheer; two-masted cat rig, and carries sprit foresail and mainsail; sails comparatively small.

Dimensions of boat.—Length over all, 22 feet 8 inches; beam, 8 feet 10 inches; height amidships, bottom of keel to top of gunwale, 4 feet 6 inches; foremast, above thwart, 15 feet; mainmast, above thwart, 13 feet 4 inches. Scale of model, 1½ inches equal 1 foot.

The "No Man's Land" boat is almost identical in form with the "quoddy" boat of the eastern coast of Maine, but is differently rigged. It is very seaworthy, and sails well in strong winds. The sails are too small for much speed in moderate weather. There is no harbor at No Man's Land, and these boats are hauled out on the beach at night and launched through the surf in the morning, unless the weather is fine enough to permit of their remaining at their moorings.

Gift of Capt. William H. Cleveland. Cat. No. 25,898 U.S.N.M.

Block model of fishing boat.

The boats built from this model are employed in the shore fisheries off No Mans Land and to a less extent about Vineyard Sound, Mass.

They are two-masted cat-rigged boats, carrying a loose-footed gaff foresail and boom and gaff mainsail.

A wooden, clinker built, keel boat, with sharp ends, raking stem and sternpost, sharp floor, and flaring side.

Dimensions of boat.—Length, 17 feet; beam, 6 feet. Scale of model, 1 inch equals 1 foot.

Gift of James Beetle. Cat. No. 54.477 U.S.N.M.

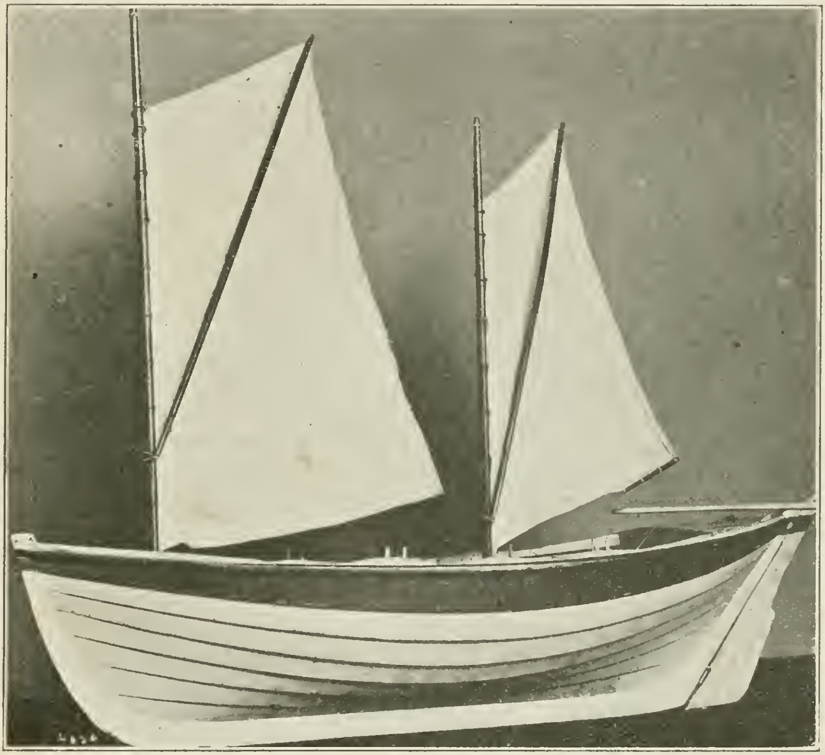


FIG. 54.—NO MAN'S LAND BOAT.

Model of whaleboat.

This is a miniature of a fully equipped 30-foot whaleboat, such as was built at New Bedford, Mass., for the prosecution of the whale fishery in all seas, but with special reference to Arctic whaling. Its equipment of craft and gear—mast, sails, oars, rowlocks, etc.—is complete, and represents in exact miniature the outfit of a whaleboat when leaving a ship's side to engage in the chase.

This is a carvel-built, centerboard boat; planking of cedar; gunwales, keel, frame, and thwarts of hardwood; sharp ends; round easy bilge; flaring side; raking curved stem and sternpost; good sheer; open; five thwarts; one mast, boom and gaff mainsail and jib, the latter tacking down to stem head.

Dimensions of boat.—Length over all, 30 feet; beam, 6 feet 6 inches; depth, 2 feet 3 inches; mast, extreme length, 24 feet 4½ inches; main boom, 19 feet 6 inches; gaff, 13 feet 3 inches; length of oars, 18 feet; steering oar, 21 feet. Scale, 2 inches equal 1 foot.

Boats of this type were long in use by the New England whalemen; they were the result of the necessities of the whale fishery, and were noted for their lightness, strength, elasticity, buoyancy, seaworthiness, and the ease with which they could be rowed or turned.

American whaleboats had smooth bottoms, battened seams, loggerhead aft, five thwarts, and invariably mast, mainsail, and jib. The lengths varied from 28 to 29 or 30 feet. The term "craft" includes the harpoons, lances, boat spade and boat hook, but was oftentimes more specifically applied to the implements used to strike and kill the whale. "Boat gear" comprehensively includes the entire outfit of the boat, but more particularly refers to the implements other than craft, such as the boat bucket, piggin, water bucket, line tubs, lantern keg, oars, paddles, and the like.

A boat's crew consisted of six men; the officer of the boat, who was one of the mates, with the title of "boat header"; the harpooner, a petty officer whose rank was next to that of a mate, known as "boat steerer," and five oarsmen. The boat steerer struck the whale and the officer usually killed it. The oarsmen had their appointed places in the boat and their respective duties to perform as whalemen.

Deposited by the Bureau of Fisheries. Cat. No. 57,199 U.S.N.M.

Model of quoddy.

Used in general fisheries of eastern Maine, but chiefly employed in herring fishery. Boats of this class vary from 20 to 35 feet in length; they are excellent sea boats, stiff, and good sailers.

Carvel-built (many of these are clinker-built) keel boat; open, except at bow; "cuddy" forward; sharp forward and aft; broad beam; deep; high bilge; curved stem; straight sternpost; cat-rigged, with single mast and one boom and gaff sail.

Dimensions of boat.—Length over all, 35 feet; beam, 12 feet; length of mast, 39 feet 6 inches. Scale of model, one-half inch equals 1 foot.

Gift of Albert Hallet. Cat. No. 12,099 U.S.N.M.

Model of quoddy.

This type of boat is used chiefly in the herring weir fishery at Lubec, Me., and vicinity, especially for carrying small herring from the weirs to the packing houses ("factories") to be made into sardines. It is extensively employed in fisheries in eastern Maine, and its generic name is a contraction of Passamaquoddy, an Indian name given to the head and bay in close proximity to Lubec and Eastport.

It is a sharp-ended, carvel-built, partially-decked, keel boat; deep and wide; rising floor; raking, curved stem; raking, straight sternpost; good sheer; decked forward, with cuddy underneath; cockpit or open space aft of cabin; washboards along the sides; sloop rigged, carrying boom and gaff mainsail and jib.

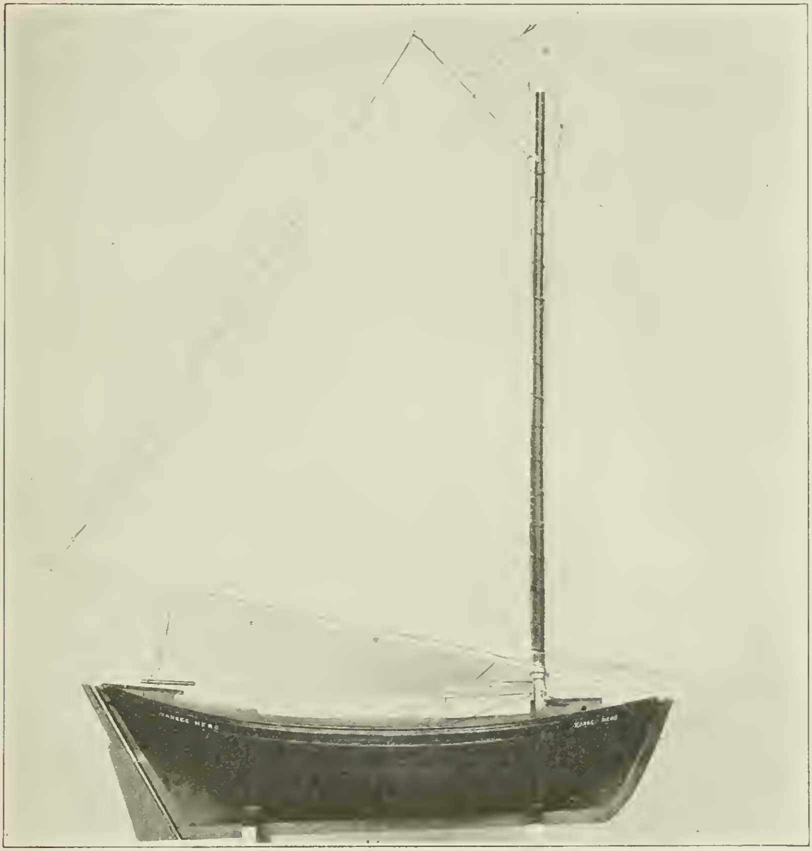


FIG. 55.—QUODDY FISHING BOAT "YANKEE HERO."

Dimensions of boat.—Length over all (including stem and sternpost), 33 feet; beam, extreme, 11 feet 3 inches; depth, 4 feet 6 inches; open space, 15 feet long, 5 feet 9 inches extreme width; mast, above deck, 39 feet 3 inches; bowsprit, outboard, 6 feet 6 inches; boom, 29 feet; gaff, 10 feet. Scale, 1 inch equals 1 foot.

This is a fine representative of a class of boats which combines speed, seaworthiness, stability, and capacity in an unusual degree.

They are often rigged as single-masted "cats," but the larger boats usually carry a jib.

The boat *Yankee Hero*, of which this is a miniature, was built at Lubec in 1889.

Deposited by the Bureau of Fisheries. Cat. No. 76,266 U.S.N.M.

Model of felucca.

Felucca-rigged boats of this type, varying in size from 20 to 36 feet in length, are used for market fishing from San Francisco, Calif., and at other points on the California coast. They fish in bay and ocean. The type is distinctively from southern Europe; they are owned and manned chiefly by natives of Italy, though Portuguese and Greeks sail on them.

A wooden, carvel-built, keel, double-ended boat; bow and stern moderately sharp, rather strongly convex above and hollow lines at and below water line; stem and sternpost straight and nearly vertical; with large hatch amidships; cockpit aft for steersman; a single mast stepped nearly amidships and raking forward; one large lateen sail. (A jib is usually carried.)

Dimensions of boat.—Length, 20 feet; beam, 7 feet 3 inches; depth, 2 feet 9 inches; bowsprit, 2 feet 6 inches; mast, above deck, 13 feet 3 inches; yard, 24 feet 6 inches; sail, 23 feet on yard, 18 feet 6 inches on foot. Scale of model, 1 inch equals 1 foot.

The larger boats of this class go as far as Drakes Bay, Monterey, or the Farralone Islands. They are reputed to be swift and able.

Collected by Livingston Stone. Cat. No. 22,213 U.S.N.M.

Model of felucca.

Lateen-rigged feluccas of this type are more extensively employed in the market fisheries of the Pacific Coast States than any other boat, and are particularly in favor at San Francisco, where they originated and where they are chiefly used, though they are found in many other localities along the coast of California. These boats range in size from about 20 to 36 feet in length; the majority of those fishing outside of the Golden Gate are upward of 28 feet long.

A wooden, carvel-built, keel boat; ends alike; moderately sharp bow and stern, both strongly convex at top and hollow at and below water line; straight stem and sternpost; rising floor; flaring side; good sheer; flush deck; large covered hatchway amidships; cockpit aft for steersman; felucca rigged, with single mast and one lateen sail.

Dimensions of boat.—Length over all, 21 feet 6 inches; on keel, 21 feet; beam, 7 feet 3 inches. Scale of model, 1 inch equals 1 foot.

Boats of this type are reputed to be swift; they also are stiff. The fishermen often take great risks in carrying a press of sail in strong winds. "The men are reckless, and their lateen sails are often seen beating against the wind when pleasure yachts are glad to find a harbor."

Collected by Livingston Stone. Cat. No. 22,214 U.S.N.M.

Block model of quoddy.

The "quoddy" boat is sloop or cat-rigged and is largely employed in the herring and other shore fisheries in Passamaquoddy Bay and vicinity. It is celebrated for speed and seaworthiness.

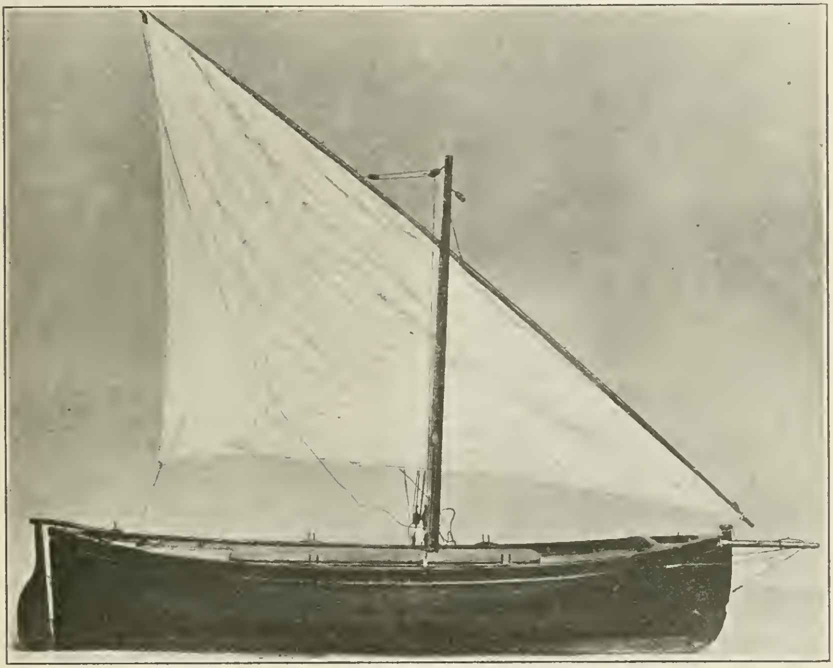


FIG. 56.—SAN FRANCISCO FELUCCA.

A carvel-built, sharp ended, keel boat, with broad beam and high floor.

Dimensions of boat.—Length over all, 37 feet; beam, 12 feet 3 inches; depth, 5 feet. Scale of model, one-half inch equals 1 foot.

The boats built from this model were among the largest and swiftest of their class. Their lines were somewhat finer than the ordinary boat of this type.

Gift of Albert Hallet. Cat. No. 54,478 U.S.N.M.

Block model of quoddy.

The fishing boat *Yankee Hero* was built from this model at Lubec, Me., in 1889, for the special purpose of attending upon the herring weirs in the vicinity and transporting the fish to the smokehouses or sardine cannery.

A sharp ended, carvel-built, keel boat, with rising floor; raking stem and sternpost; good sheer.

Dimensions of boat.—Length over all, 32 feet; beam, 11 feet; depth, molded, 4 feet 8 inches. Scale of model, three-fourths inch equals 1 foot.

Gift of J. Brown. Cat. No. 76,293 U.S.N.M.

Block model of carry-away boat.

This is a model of a menhaden carry-away boat, style of 1865. Twelve such boats were made from this particular model. These boats were sharp at both ends, like the Block Island fishing boat, from which they originated, but were made much shallower to enable them to carry a large load on light draft of water. They were rigged with one mast and a single large sail, were generally open boats, and were quite remarkable for their stiffness and speed. They have been superseded by small, clipper, decked sloops, that are more suitable for the business, since the crews can remain on board.

Sharp at both ends; wide and rather shallow; high rising floor; flaring side.

Dimensions of boat.—Length, 35 feet 6 inches; beam, 14 feet; depth, 3 feet 9 inches. Scale of model, 1 inch equals 1 foot.

Gift of Charles A. Jackson. Cat. No. 54,341 U.S.N.M.

Model of surfboat.

This represents a class of boats somewhat extensively used in 1876 by the Lighthouse Board, and to a less extent by the Life Saving Service of northern New England. Boats of this type (but generally provided with sails) were very much in use in the coast fisheries in the locality mentioned. They are excellent sea boats and easily propelled by oars or sails.

Open rowboat; lapstreak; sharp forward and aft; curved stem, straight sternpost.

Dimensions of boat.—Length over all, 22 feet; beam, 6 feet 3 inches; height amidships, 3 feet; oars, 14 feet 6 inches long. Scale of model, 2 inches equals 1 foot. Cat. No. 24,999 U.S.N.M.

Model of sharpie.

This model represents the typical two-sail, cat-rigged "sharpie," which had its origin in connection with the prosecution of the oyster fishery of Connecticut, but is now extensively employed in various fisheries along the Atlantic coast of the United States, especially in southern New England and North Carolina. Boats of this form and rig sail swiftly and are particularly well adapted to the fisheries in regions where the water is shallow, in large inclosed sounds or bays like those of North Carolina.

This is an open, carvel-built, flat-bottomed, centerboard boat, with long sharp bow; slightly flaring side; after sections of bottom curved upward to form run; square stern; good sheer; leg-of-mutton sails, with sprits to extend clews.

Dimensions of boat.—Length over all, 35 feet; beam, 10 feet 9 inches; depth, 3 feet; cockpit, 15 feet 9 inches long by 7 feet 9 inches wide; foremast, above deck, 33 feet 6 inches; mainmast, above deck, 29 feet 6 inches; fore sprit, 20 feet; main sprit, 14 feet 6 inches. Scale of model, 1 inch equals 1 foot.

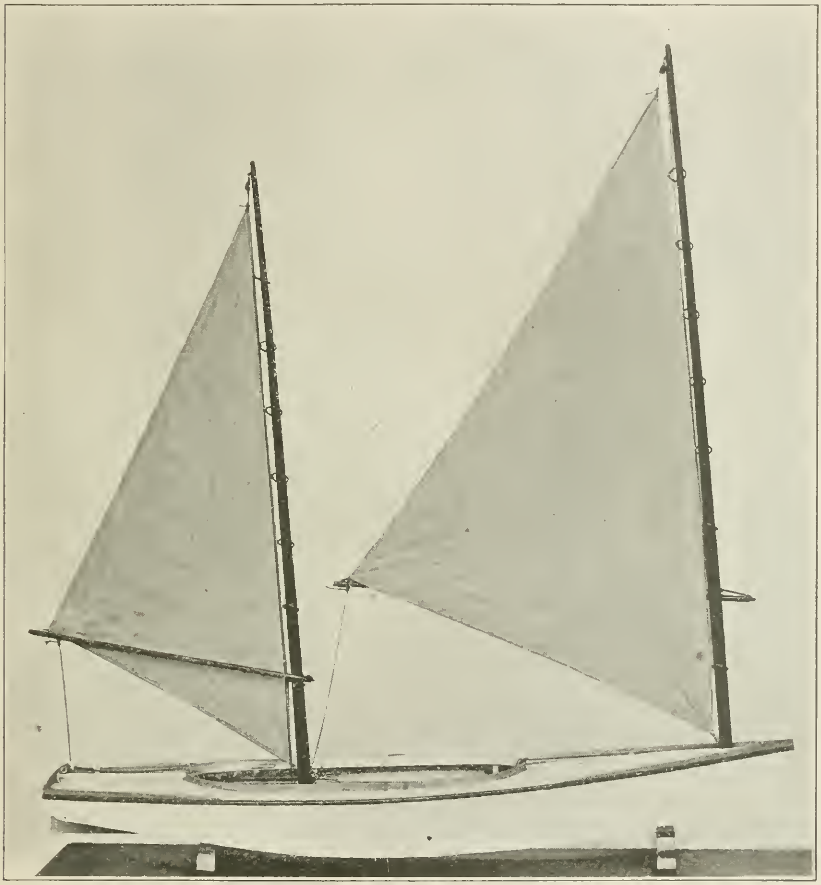


FIG. 57.—ATLANTIC COAST SHARPIE.

Deposited by the Bureau of Fisheries. Cat. No. 76.249 U.S.N.M.

Model of purse seine boat.

This model represents the class of boats exclusively used in the mackerel purse seine fishery of New England. These boats vary in length from 32 to 40 feet, the larger sizes (those from 35 to 38 feet long) coming into use in 1875, while boats 40 feet long were first built in 1882.

Specifications call for a wooden, carvel-built keel boat; open; sharp at both ends, the stern being widest and fullest; raking, curved stem and sternpost; round, easy bilge; six thwarts; fitted with rowlocks, pursing gear, oar holders, oars, purse seine, towing link, pump, etc.

Dimensions of boat.—Length over all, 36 feet; beam, 8 feet; height amidships, 2¾ feet; ends, 4½ feet; oars, 12 feet long; one steering oar, 18 feet long. Scale of model, 1 inch equals 1 foot.

The model is painted like the original after which it was made. These boats usually had a bright green bottom and white top, with more or less bright-colored beads—red and yellow being most commonly used. They are wider aft than forward to secure the requisite buoyancy, since the seine is stowed aft. They turn quickly, row easily, and tow well. A boat can be towed 10 or 12 miles an hour, or even more, with safety. Cat. No. 25,826 U.S.N.M.

Block model of sharpie.

From this model a large "sharpie" was built at Tampa, Fla., to engage in the Gulf coast fisheries from that port, but more especially to transport the catch from the coast "fishing ranches" to Tampa. Vessels of this kind, with flat bottom and light draft, are especially well adapted to the fisheries on some sections of the Florida coast, where the water is shallow. They sail swiftly and carry a large cargo on a minimum draft.

A wooden, flat-bottomed, centerboard vessel, with long sharp bow, round stern, slight flare to sides; after section of bottom curved strongly upward; good sheer; rigged as two-masted schooner, with leg-of-mutton sails.

Dimensions of vessel.—Length over all, 56 feet; beam, 12 feet; depth, bottom of garboard to top of gunwale, 4 feet. Scale of model, one-half inch equals 1 foot.

Gift of W. S. Sweat. Cat. No. 76,292 U.S.N.M.

Model of pound boat.

Boats of this class are used in the pound net fisheries of the Great Lakes, and their peculiar construction enables them to carry large quantities of fish in shallow water and to lift the bowl of the pounds without upsetting.

Flat bottom; "sharpie" model; centerboard; straight sides; square stern; open; washboards, rigged complete with spars, etc. Two sails, three-cornered above the gaffs, like gaff-topsails.

Dimensions of boat.—Length over all, 24 feet 9 inches: beam, 9 feet 6 inches; width of stern, 7 feet; depth, amidships, 3 feet; foremast, 23 feet 3 inches; mainmast, 21 feet 6 inches. Scale of model, 1 inch equals 1 foot. Cat. No. 26,790 U.S.N.M.

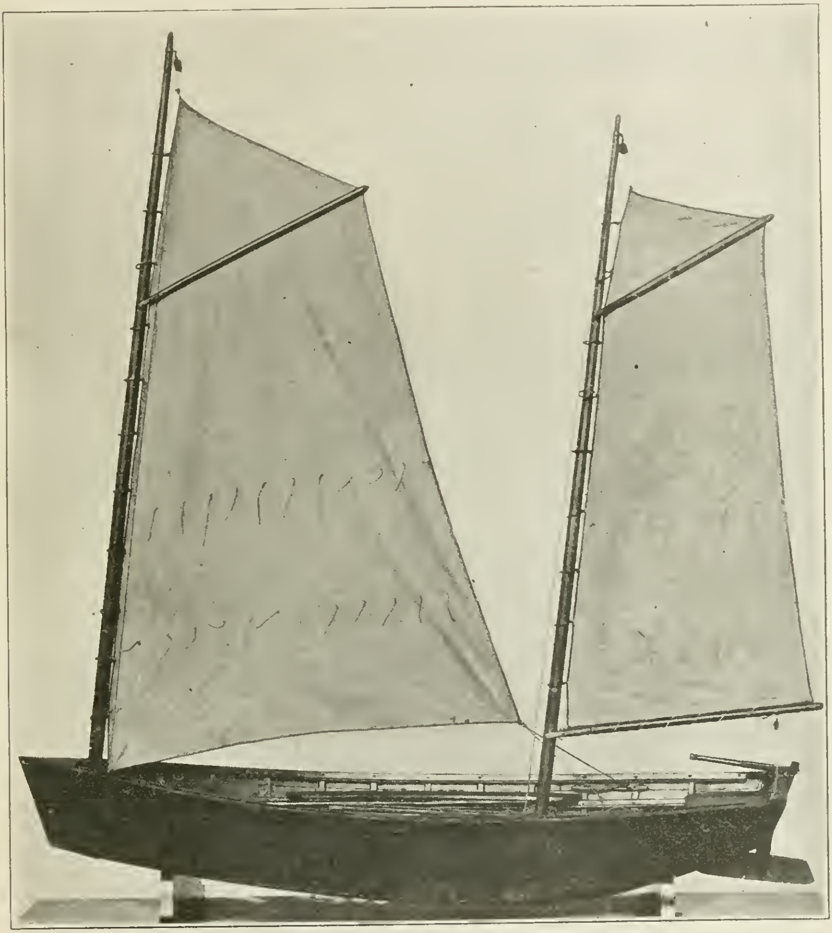


FIG. 58.—NORTH CAROLINA SHARPIE.

Model of pound net boat.

In operating pound nets in the waters of North Carolina a flat-bottomed boat of the "sharpie" pattern, similar to the pound-net boat of the Great Lakes region, has been adopted. This model is a miniature of one of the boats used on Albemarle Sound.

This is a wooden, carvel-built, open, centerboard boat, with sharp bow; flat bottom, curving up at after end; wide square stern; no skag; two-masted cat rig; sails jib-headed, with gaff.

Dimensions of boat.—Length over all, 28 feet; beam, 9 feet 6 inches; depth, 3 feet; foremast, above thwart, 27 feet 3 inches; mainmast, above thwart, 25 feet 6 inches. Scale of model, 1 inch equals 1 foot.

Deposited by the Bureau of Fisheries. Cat. No. 76,265 U.S.N.M.

Model of oyster boat.

Used in the oyster fishery at Cedar Keys, Fla. Built broad and flat to enable it to carry a load on the smallest draft, so that it can sail in the shallow waters of the locality.

A wooden, flat-bottom, carvel-built, centerboard boat; strongly convex, projecting forward at bottom; straight stem raking backwards at top; moderately flaring sides; bottom strongly cambered aft; skag; wide, square stern; wide rudder hung outside; slight sheer; decked for short space forward and aft, wide washboards along sides, with high coamings around open space; one thwart amidships; cat rigged, with one boom and gaff sail.

Dimensions of boat.—Length, 20 feet; beam, extreme, 11 feet; depth, 21 inches; mast, above gunwale, 17 feet 4 inches; boom, 19 feet 6 inches; gaff, 10 feet; oars, 12 feet 3 inches. Scale of model, 1 inch equals 1 foot.

Deposited by the Bureau of Fisheries. Cat. No. 76,272 U.S.N.M.

Model of fishing boat.

Used in the general fisheries on the west coast of Florida, notably at St. Andrews.

An open, carvel-built, wooden, centerboard boat of the "sharpie" pattern, with long, wedge-shaped, sharp bow; straight, nearly vertical stem; sides flaring slightly aft; bottom cambered; skag forward and aft; wide, square stern; rudder outside; seat at bow and stern; wide throat for mast step; one thwart aft of centerboard case; sloop-rigged with loose-footed sprit mainsail and jib, the latter tacking to stem head; equipped with three oars.

Dimensions of boat.—Length, 20 feet 9 inches; beam, 5 feet 7 inches; depth, 22½ inches; mast, above gunwale, 14 feet 8 inches; sprit, 18 feet 6 inches; oars, 12 feet 2 inches. Scale of model, 1 inch equals 1 foot.

Deposited by the Bureau of Fisheries. Cat. No. 76,273 U.S.N.M.

Model of shrimp boat.

Used by the Chinese fishermen on San Francisco Bay, Calif., but chiefly in the shrimp fishery.

A wooden, flat-bottom, keelless, double-ended boat; entirely open; sharp, wedge-shaped ends; little sheer; platform fore and aft; two thwarts; bottom straight in center, cambers at ends; propelled by oars and sails; has single large lateen sail; mast stepped about one-third boat's length from bow.

Dimensions of boat.—Length, 39 feet; beam, 7 feet; depth of hold, 3 feet. Scale of model, 1⅗ inches equal 1 foot.

Boats of this class vary from 15 to 40 feet in length, are managed by two or three Chinamen, and are employed in the general coast fisheries of California, though most commonly found in San Francisco Bay. They are constructed in a rough manner, and their cost is comparatively trifling. They are convenient, however, for landing on beaches or for working in shallow water. They sail well, running free, and are light and buoyant in a seaway.

Cat. No. 22,217 U.S.N.M.

Model of dory.

The class of boats which this model represents is used by the shore fishermen of New England, especially at Cape Ann, the custom of the men being to fish not far from the coast and usually to return home after a day's or night's fishing. They are good sailers and have excellent sea boats.

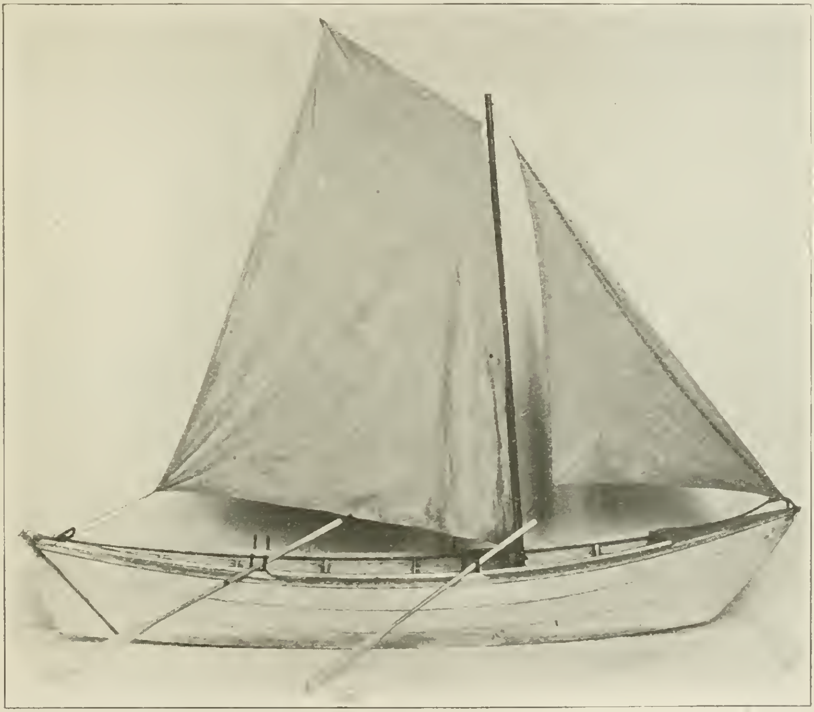


FIG. 59.—NEW ENGLAND DORY.

An open, clinker-built, flat-bottom, keelless boat; slightly rounded, flaring sides; sharp bow; narrow, V-shaped stern; centerboard; washboards along sides; decked forward; three thwarts; kid boards;

oars; thole pins; two sails—mainsail and jib; mast hole in each of two forward thwarts; rudder.

Dimensions of boat.—Length over all, 21 feet; beam, 5 feet; depth, admidships, 21¾ inches; length of mast, 14 feet. Scale of model, 4 inches equal 1 foot. Cat. No. 57,573 U.S.N.M.

Model of dory.

This type of boat is used in the general sea fisheries of New England. It is a wooden, clinker-built, open flat-bottom boat, with sharp bow, narrow V-shaped stern and flaring sides.

Dimensions of boat.—Length over all, 18 feet 6 inches; bottom, 15 feet; beam, 5 feet; depth, 2 feet. Scale of model, 1 inch equals 1 foot.

Gift of Starling & Stevens. Cat. No. 55,792 U.S.N.M.

Model of dory.

This is a type of boat used by clam gatherers at Nantucket and vicinity. It is a wooden, clinker-built, open, flat-bottom boat, with sharp bow, flaring sides, narrow V-shaped stern.

Dimensions of boat.—Length over all, 16 feet 6 inches; beam, 4 feet; extreme width of bottom, 2 feet 6 inches. Scale of model, 1 inch equals 1 foot.

Gift of W. H. Chase, 2d. Cat. No. 25,657 U.S.N.M.

Model of gill-net boat.

At Cedar Keys, Fla., this type of boat is used in operating gill nets for mullet, etc. It is a wooden, carvel-built, open, flat-bottom rowboat, with sharp bow, square stern, good deal of camber to bottom fore and aft, and skags at bow and stern; platform at stern for stowing nets; fitted with oars.

Dimensions of boat.—Length over all, 20 feet 6 inches; beam, 7 feet 9 inches; depth, 1 foot 7½ inches. Scale of model, 1 inch equals 1 foot.

Deposited by the Bureau of Fisheries. Cat. No. 76,271 U.S.N.M.

Model of shore dory.

Used at Cape Ann and elsewhere on the New England coast for fishing from the shore. One or more men row or sail to the fishing ground from home and return in the latter part of the day. A sprit mainsail and a jib, the latter tacking down to the stem head, are usually carried.

A wooden, clinker-built, flat-bottom, centerboard boat; long, sharp, flaring bow; raking stem; flaring side; narrow V-shaped raking stern; graceful sheer; decked for short space forward; washboards along sides, with coamings around open portion; three thwarts; kid boards, oars, etc.

Dimensions of dory.—Length over all, 23 feet; beam, 5 feet 3 inches; depth, 27 inches. Scale of model, 1 inch equals 1 foot.

Cat. No. 160,179 U.S.N.M.

Model of fish lighter.

These boats vary in length from 45 to 60 feet and are used for transporting fish from the lower Potomac River to market. A boat is anchored near each fishing station on the river and the daily catch of fish is put on board. At a certain time of the day the boats are picked up by a steam tug which tows 10 to 15 miles to Washington, D. C. They are invariably covered with coal tar.

Flat bottom, flatiron shaped; decked with long, wide hatchway, covered with four hatches; cuddy aft; rudder; towing bit forward.

Dimensions of lighter.—Length over all, 52 feet; beam, 14 feet 8 inches; depth of hold, 5 feet 4 inches. Scale of model, three-eighths inch equals 1 foot.

Gift of George Woltz. Cat. No. 56,950 U.S.N.M.

Block model of skipjack.

This is a model from which several fishing boats of the so-called "shipjack" type were built at Vineyard Haven, Mass.

A wooden, clinker-built, centerboard boat, with long sharp bow; stem straight and plumb above water, curvel at forefoot; rising floor extending into run and to stern at same angle; side forming an acute angle with bottom and flaring very slightly; skag aft; V-shaped raking stem; graceful sheer.

Dimensions of boat.—Length over all, 20 feet 9 inches; beam, 7 feet; depth, molded, 2 feet 4 inches. Scale of model, 1 inch equals 1 foot.

Boats of this class can be built with comparatively little cost; they are very swift and are useful for many purposes. At Provincetown, Mass., they are called "corner boats," because the bottom and top meet at a sharp angle, forming a corner. This type is a compromise between the flat-bottom and round-bottom boat, but is not so popular as either. Cat. No. 160,122 U.S.N.M.

Model of oyster canoe.

Dugout canoes of this type were generally called "cunners," and were extensively employed in the oyster fisheries of the Chesapeake Bay and its tributaries. They were used chiefly for tonging oysters and were preferred by the oystermen to any other form of boat.

An open, sharp-ended, keel dugout, with long, easy lines and moderately raking stem and sternpost; widest forward of amidships; fitted with washboards running along each side from stem to stern;

equipped with oyster tongs and oars; two-masted cat rig—two leg-of-mutton sails.

Dimensions of boat.—Length, 27 feet 6 inches; beam, 5 feet 3 inches; depth, 2 feet 9 inches; oars, 9 feet; oyster tongs, 17 feet long; heads, 2 feet wide; foremast, 20 feet 3 inches; mainmast, 16 feet 3 inches. Scale of model, 1 inch equals 1 foot.

Cat. No. 25,003 U.S.N.M.

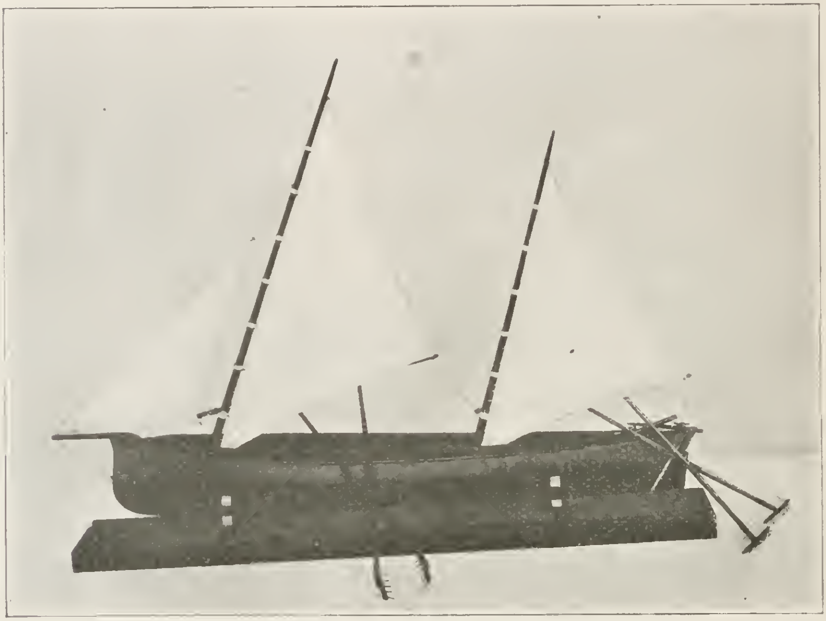


FIG. 60.—CHESAPEAKE BAY DUGOUT CANOE.

Model of dugout canoe.

Dugout canoes of this type are used on the Roanoke River, N. C., in the dip-net or skim-net fishery for shad.

Made by hollowing out a log, sharp at both ends; shallow; nearly flat bottom; decked for short distance at each end; three seats; center of boat decked over and formed into a box or well for keeping fish alive; two oars.

Dimensions of boat.—Length, 18 feet 3 inches; beam, 3 feet; depth, 1 foot; well, 1 foot 9 inches long fore and aft, arches on top, opening 6 by 9 inches. Scale of model, 1 inch equals 1 foot.

Deposited by the Bureau of Fisheries. Cat. No. 76,275 U.S.N.M.

Model of dugout canoe.

This type of canoe is used for fishing on the rivers and bayous of the Southern States. It is an open, round-bottom, boat-shaped, keelless dugout canoe; sharp, wedge-shaped, nearly vertical bow, curved at forefoot; moderately flaring sides; short full run; square, heart-shaped, nonoverhanging stern; straight on top; two thwarts and seat at stern; four oars.

Dimensions of canoe.—Length, 17 feet; beam, 3 feet; depth, inside, 16 inches; oars, 6 feet 2 inches long. Scale of model, 2 inches equal 1 foot. Cat. No. 55,820 U.S.N.M.

Model of dugout.

Chinese fishermen use this type of dugout on the coast of California and Oregon. It is of unpainted wood, roughly made, with narrow flat bottom; slightly rounding bilge; straight sides; square ends; narrow beam; strong sheer. It is dug out of a solid log, the ends being nailed on, and is divided into four compartments by bulkheads. There are washboards on the sides. It is fitted with two long sweeps and poling stick. The sweeps are held to the single thole pin by a becket.

Dimensions of canoe.—Length, 20 feet; beam, 3 feet 6 inches; depth, 2 feet 3 inches. Scale of model, 1 inch equals 1 foot.

Deposited by the Bureau of Fisheries. Cat. No. 72,744 U.S.N.M.

Louisiana pirogue.

A type of dugout canoe locally called "pirogue," used for fishing in the bayous and rivers of Louisiana; made of a single cypress log.

An open, flat-bottom, keelless, dugout canoe; with round and flaring sides; sharp hollow bow, straight and nearly vertical above water line, curved below; long easy run; V-shaped nonoverhanging stern; straight, slightly raking sternpost; moderate sheer; two wooden rowlocks on each side with two thole pins in each; a seat at each end; battens for thwarts along the sides. This canoe is of the conventional boat form and somewhat resembles a long narrow boat of the Whitehall pattern.

Dimensions of canoe.—Length, 17 feet 8 inches; beam, 30 inches; depth, 11½ inches. Cat. No. 160,353 U.S.N.M.

Model of fishing schooner.

This type of a welled two-masted schooner is used in the market fisheries of the Bahama Islands. It is reputed to be swift, especially in windward sailing.

This is a wooden carvel-built keel vessel, with long sharp bow; recurved, raking stem; very sharp floor; long, lean run; light square stern; moderate sheer; flush deck, nearly level with log rail; large cabin trunk. Schooner rigged, with three sails, jib, loose-footed foresail, and mainsail; equipped with two small, square stern boats; one net; one scoop net; two boat oars.

Dimensions of vessel.—Length over all, 54 feet; beam, 14 feet 3 inches; depth, 5 feet; keel, 21 inches deep; cabin trunk, 12 feet long.

7 feet wide; bowsprit, outboard, 10 feet; foremast, above deck, 44 feet; foregaff, 12 feet; mainmast, above deck, 44 feet; main topmast, 15 feet; main boom, 30 feet; main gaff, 13 feet. Scale of model, one-half inch equals 1 foot.

The bottoms of these vessels are sheathed with yellow metal to prevent the planks from being injured by the toredo or marine boring worm, and, for the same reason, are fish wells generally covered inside with sheet lead. Recently an improved type of fishing schooner is coming into use in the Bahamas, and some of those recently built are as fine looking vessels of their class as can be seen in any country.

Gift of Bahama Islands Centennial Commission.

Cat. No. 76,010 U. S. N. M.

Model of sponge-fishing schooner.

Schooners of this type are employed about the Bahama Islands in gathering sponges from the reefs. The sponges are taken by men who go out in the small boats while the vessel cruises about near by.

This is a wooden, carvel-built, keel, two-masted schooner; with bow sharp, flaring moderately above water; raking, curved stem; long head; deep keel; sharp floor; flaring side; long, very lean run; slightly raking sternpost; wide V-shaped stern; medium sheer; low bulwark; large cabin trunk; carries three sails—jib, lug-footed foresail, and boom and gaff mainsail. Two boats are stowed bottom up on deck; sponges, sponge hooks, etc., on deck.

Dimensions of vessel.—Length over all, 54 feet; beam, 14 feet 6 inches; depth, 5 feet; bowsprit, outside, 10 feet 6 inches; foremast, above deck, 43 feet 6 inches; foregaff, 12 feet; mainmast, above deck, 44 feet; main topmast, heel to truck, 14 feet; main boom, 30 feet; main gaff, 13 feet 6 inches; boats, 13 feet long; sponge hooks, one 17 feet long and the other 25 feet. Scale of model, one-half inch equals 1 foot.

These vessels have a striking resemblance to the deep Baltimore clipper schooners of 75 years ago, and doubtless the type had its origin in Chesapeake Bay.

Gift of Bahama Islands Centennial Commission.

Cat. No. 160,143 U.S.N.M.

SKIN BOATS.

Indian coracle or "bull boat."

Used by the Hidatza (Gros Ventres) Indians for crossing streams, etc.

A circular bowl-shaped coracle, made by stretching buffalo hide over a rude frame of boughs or saplings.

Dimensions of coracle.—Diameter, 5 feet 2 inches; depth about 18 inches.

Collected by W. Matthews. Cat. No. 9.785 U.S.N.M.

Kaiak.

Type used by Eskimos at Cape Espenberg, Alaska. A decked, round-bottom keelless skin canoe, with flaring sides, sharp-pointed bow, sharp raking stern; high-ridged deck sloping off suddenly at stern; manhole near center.

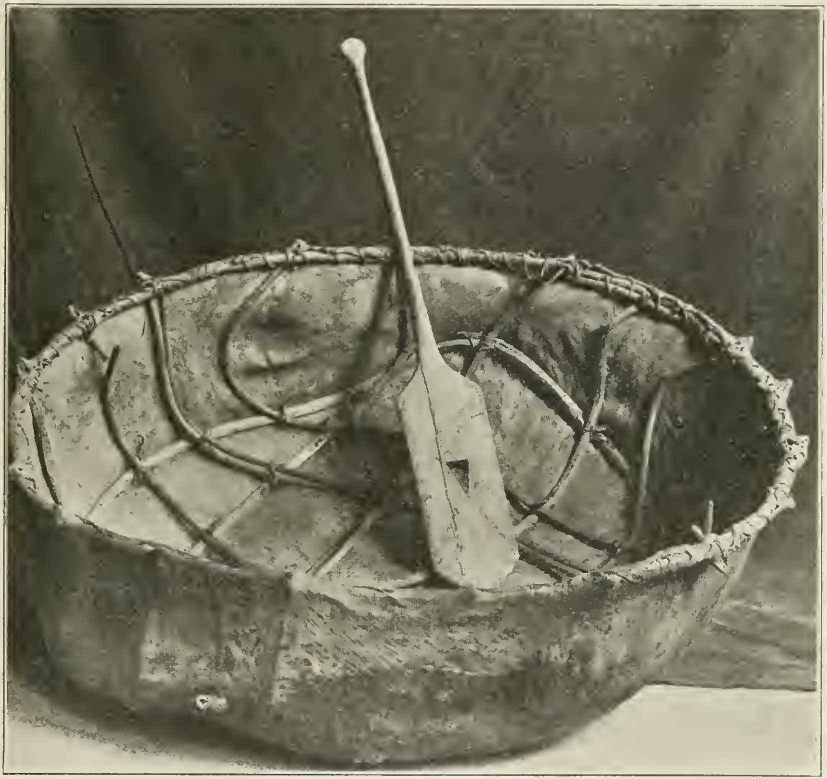


FIG. 61.—AMERICAN INDIAN CORACLE OR "BULL BOAT."

Dimensions of kaiak.—Length, 14 feet 4 inches; beam, 24 inches; depth, 13 inches; longitudinal diameter of manhole, 23 inches; width, 16½ inches. Cat. No. 129,575 U.S.N.M.

Kaiak.

Type used by the Eskimos at Cape Blossom, Alaska, for hunting. A decked, flat bottom, keelless skin canoe, with slightly flaring sides, long, pointed ends, straight, flat deck, except in front of manhole in center, where it is strongly ridged. Manhole set at angle, being much the highest in front; equipped with one double-bladed paddle; made of sealskins sewn together with sinews when green and stretched over a light frame constructed of driftwood.

Dimensions of kaiak.—Length, 17 feet 6 inches; beam, 19 inches; depth, 7½ inches; paddles, 7 feet 9 inches long; manhole, 17½ by 16½ inches.

Cat. No. 129,573 U.S.N.M.

Kaiak.

Type used by Eskimos at Kusilvak, north of the Yukon River. A decked, keelless, skin canoe, made by covering a light wooden frame with sealskin, the only opening being the circular manhole in the center of the deck; round bottom; flaring sides; long, sharp bow curving up from below; sharp, nearly vertical stern; strongly ridged deck, the central deck support extending at each end for a few inches to afford a hand grasp, the forward end meeting the curved-up point of the bow; equipped with the following: One hunting visor (*Ich-l-e-ark*), tray containing harpoon line and harpoon (*A-chi-'uk*), two throwing sticks (*Noo-zhach-put*), seal lance (*Noo-gwh-or-it*), ice grapple or safety hook (*Too-weh-uk*), paddle (*Ung-wah-rut*), sealskin bag float (*Ch-oo-wen-uk*).

Dimensions of kaiak.—Length, 16 feet; beam, 26½ inches; depth, 13 inches; harpoon, 5 feet long.

The names given in parentheses are equivalents in the Eskimo language as furnished by the Alaska Commercial Co.

Cat. No. 160,337 U.S.N.M.

Kaiak.

Built and used by the Eskimos at St. Michael, in northern Alaska. A sharp-ended, keelless, skin canoe, made of sealskin, sewed together with sinews and stretched over a wooden frame while the skins are green, so that when dry the covering becomes tight and rigid; the sealskin is kept well oiled to exclude the water. The kaiak has a long, sharp bow, curved up at the end like the front of a sled runner; bottom nearly flat and narrow, tapering to a point at each end; sides strongly flaring; long, sharp stern; nearly vertical at end; deck with high straight central ridge, sloping steeply to each side, and terminating at each end in projection for hand grasp, the forward one lapping over the end of the bow and forming a sort of hole; large circular manhole near longitudinal center, with elevated rim, and nearly as wide as the kaiak; frame of canoe lashed together with strips of sealskin.

Dimensions of kaiak.—Length, 17 feet; beam, 2 feet 4 inches; depth amidships, 14⅛ inches; diameter of manhole, fore and aft, 22¼ inches, transversely, 24 inches.

Cat. No. 160,175 U.S.N.M.

Kaiak.

Type used by the Eskimos of Nunivak Island, Alaska, for fishing and hunting. The boat is covered with the skin of the sea lion stretched over a light framework made of driftwood. It is sharp at both ends, the bow rising with a long, easy curve from the bottom, and at its upper extremity is a hole 7 inches in diameter for grasping with the hand. The top of the kaiak is completely covered, excepting a single manhole in the center.

Dimensions of boat.—Length, 15 feet 3 inches; beam, 30 inches; depth, 18 inches.

Deposited by the Bureau of Fisheries. Cat. No. 76,283 U.S.N.M.

Kaiak.

Type of boat used by the Eskimos at Unalaklik, 60 miles north of St. Michael, Alaska. A decked keelless, skin canoe, made by covering a light wooden frame with sealskin. The bottom is round; sides flaring; long, sharp bow curving up from below; sharp, nearly vertical stern; sharply ridged deck, the central deck support extending at each end for a few inches to afford a hand grasp, the forward end meeting the apex of the bow so as to nearly form a hole.

Dimensions of boat.—Length, 17 feet; beam, 24¾ inches; depth, 13¼ inches; diameter of center manhole, 22 inches.

Collected by Alaska Commercial Co. Cat. No. 160,327 U.S.N.M.

Kaiak.

Used by the Eskimos of Kings Island, Alaska, for hunting and fishing. A decked, keelless, skin canoe, having a long, sharp, upcurved bow with a small hole for hand grasp at the top; rising floor, flaring sides; sharp stern; sharply ridged deck rising at the bow and dropping abruptly at the stern.

Dimensions of boat.—Length, 15 feet 3 inches; beam, 28½ inches; depth, 13½ inches; diameter of central manhole, 20½ inches.

Collected by M. A. Healy. Cat. No. 129,577 U.S.N.M.

Two-hole bidarka.

Used by the Aleuts for hunting, fishing, and traveling. A long, narrow, round bottom, keelless, skin canoe; nearly vertical side; sharp cleft bow, rising from below in long easy curve; narrow, nearly square stern frame, beyond which the skin cover narrows into a thin fin-like projection; hogback sheer; curved deck; seams fringed with colored yarn; rosette of red and blue tape on top of bow. Equipped with the following: Two otter spears; two double-bladed paddles painted red and black; one "kamlayka."

Dimensions of bidarka.—Length, 20 feet 7 inches; beam, 23 inches; depth, 11 inches; paddles, 8 feet and 7 feet 8 inches long; spears, 4 feet 2¾ inches long. Cat. No. 160,336 U.S.N.M.

Three-hole bidarka.

Built by the Aleuts. Used by the officers of the U. S. revenue cutter *Corwin*, Capt. M. A. Healy commanding, in making explorations in 1885.

A sharp-ended, decked, round bottom, keelless canoe, with cleft bow, vertical stern, three manholes; made by covering light wood frame with sealskin; seams fringed with yarn; three double-bladed paddles.

Dimensions of bidarka.—Length, 24 feet 8 inches; beam, 30 inches: depth, 10 inches; greatest diameter of forward manhole, 25 inches; of center manhole, 28½ inches; of after manhole, 24 inches; paddles, two 8 feet long, and one 7 feet 10 inches long.

Cat. No. 76,821 U.S.N.M.

Model of two-hole bidarka.

The bidarka is used by the natives of the Aleutian Islands for hunting the sea otter and other animals. It is a long, narrow, round bottom, keelless skin canoe; with nearly vertical sides; sharp cleft bow, rising from below in long easy curve; narrow, nearly square stern frame, beyond which the skin cover narrows to a thin, fin-like projection; hogback sheer; curved deck; figure seated in each of the manholes, with the waterproof skin garment called kamlaykas tied over the rims; seams of skin fringed with colored yarn; equipped with spears, etc.

Dimensions of bidarka.—Length, 19 feet 6 inches; width, 30 inches; depth, 21 inches; paddle, 6 feet; spears of various lengths, from 4 feet to 6 feet 2 inches. Scale of model 1 inch equals 1 foot.

Collected by L. M. Turner. Cat. No. 129,212 U.S.N.M.

Model of three-hole bidarka.

This type of canoe is used chiefly for traveling among the Aleutian Islands. It is a sharp-ended, decked, round bottom, keelless canoe, with cleft bow, vertical stern; three manholes with figure in each; made by covering a light wood frame with seal skin (model covered with intestines of sea lion); equipped with paddles, etc.

Dimensions of bidarka.—Length, 23 feet 7 inches; width, 3 feet 2 inches; depth, 19 inches. Scale of model 1¼ inches equal 1 foot.

Collected by J. B. White. Cat. No. 21,605 U.S.N.M.

Model of oomiak.

Type used by the Eskimos at St. Michael, Alaska, for whaling, walrus hunting, etc.

Light wooden frame lashed with sinews and covered with sealskin, the covering lashed with thongs of skin over the gunwales to ribbands on the inside: flat bottom: sharp ends, projecting at top; single mast, supported by seats and shrouds of sealskins; a single large square sail of coarse matting fastened to the yard with sinews and set on mast, stepped near middle of canoe; yard braces, sheets, and tacks of sealskin; two oars; four paddles.

Dimensions of oomiak.—Length over all, 30 feet 8 inches; on bottom, 20 feet; beam, 9 feet; center of bottom, 4 feet wide; depth, 3 feet 8 inches; mast, 18 inches; yard, 16 feet 8 inches; sail, 16 feet by 16 feet; oars, 14 feet 4 inches; paddles from 8 feet 4 inches to 9 feet 4 inches. Scale of model 1½ inches equal 1 foot.

Boats of this kind sail well before the wind, but sails can not be used when going to windward. Cat. No. 38.882 U.S N.M.

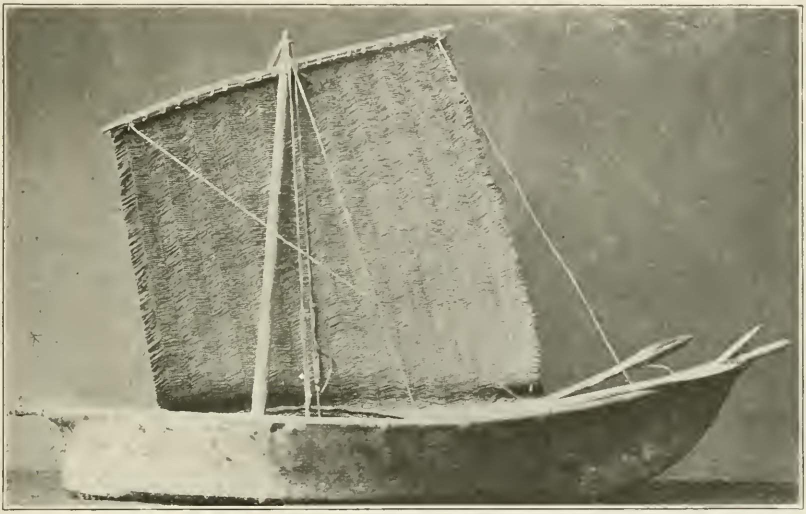


FIG. 62.—ALASKA SKIN BOAT CALLED "OOMIAK."

Model of oomiak.

Type used by the Eskimos of the Ungava section of the Hudson Bay region.

An open, double-ended, flat bottom boat, made by stretching unhaired sealskin over a wooden frame, the upper edges of the covering going over the gunwale and held firmly by a roving of hide passing through holes and over a ribband below the gunwale; bottom tapering toward each end; sides flaring; three thwarts.

Dimensions of oomiak.—Length, 24 feet 7½ inches; beam, 9 feet 3 inches; depth, 3 feet 3 inches. Scale of model 1 inch equals 1 foot.

In general this resembles the oomiak of the Greenland Eskimo, though it is not so long in proportion to width and depth.

The oomiak of the Ungava Bay region varies in length from 11 to 27 feet. Cat. No. 90,111 U.S.N.M.

Kaiak.

Type used by the Eskimos on the west coast of Greenland. Light wooden frame, lashed with thongs of sealskin; covered with thick, strong sealskin; round bottom; high, pointed ends tipped with ivory. Decked over with sealskin except the hatch, 16 inches in diameter, where the man sits amidships. Furnished with apron, harpoon shaft, lance, spear, paddle, harpoon line, buoy, rack, ice scraper, and harpoon head or point.

Dimensions of kaiak.—Length, 17 feet; beam, 21 inches; height, 18 inches; stern, 16½ inches; amidships, 12 inches.

Deposited by Chief Signal Officer, United States War Department.

Cat. No. 72,564 U.S.N.M.

Kaiak.

Type used by the Eskimos on the west coast of Greenland. The boat has sharp pointed ends shod with bone; has rising floor; nearly vertical sides; moderate sheer at bow, but stern rises higher. The covered deck is flat except forward of the central manhole.

Dimensions of boat.—Length, 17 feet 3 inches; beam, 19 inches; depth, 7½ inches.

Collected by N. P. Scudder. Cat. No. 35,667 U.S.N.M.

Kaiak.

A keelless, double-ended, skin canoe, long and very sharp, with strongly raking curved-up ends; rising floor; flaring sides; and flat deck. Bone shoes extend from the top of the bow and stern to a considerable distance along the bottom of the boat.

The boat was made by covering a light wooden framework with seal skins sewed together with sinews while moist or green and drawn over the frame. When dried out the skin covering becomes as tight and rigid as a drumhead.

Dimensions of boat.—Length, 16 feet 3 inches; beam, 19 inches; depth, 8¾ inches. Cat. No. 160,328 U.S.N.M.

Model of bidarka.

This is a peculiar form of oomiak or bidarka used by the natives of Kodiak Island, Alaska.

An open, sharp-ended, keelless, skin boat, made by stretching the skins of seals or sea lions over a wooden frame and fastening it in the usual manner, by a roving passing through holes in the edge of the covering and over a ribband on the inside of the canoe, below the gunwale. The bow is very peculiar, long and sharp, with concave water lines and terminating in a curved, almost disk-like end, above which is a flat square-ended projection that curves abruptly upward from the gunwales; bottom with considerable rise; sides flaring; stern long, sharp, and flaring, straight and slightly raking at end, with a curious projection at top, where the skin is drawn over the extended ends of the gunwales, which, in the Eskimo oomiak, are generally left uncovered. The boat has seven figures with paddles and two figures forward with bows and arrows.

Dimensions of bidarka.—Length, 29 feet 6 inches; beam, 8 feet 9 inches; depth, 3 feet 5 inches; paddles, 7 feet 9 inches; steering paddle, 8 feet 3 inches. Scale of model, 1 inch equals 1 foot.

Cat. No. 90,464 U.S.N.M.

Model of kaiak.

The Eskimo of Greenland uses this type of canoe for hunting seals, walrus, sea birds, etc. It is a keelless, double-ended skin canoe, with long, very sharp, strongly raking bow and stern, which curve up considerably, with acorn-shaped bone ornament at each extremity, and shoe of wood extending from top of each end to some distance beneath the bottom; rising floor; nearly vertical sides; flat deck; manhole in center, with figure of Eskimo holding a double-bladed paddle seated in it. The kaiak is equipped with harpoon and line of sealskin; line holder in front of boatman and wooden model of inflated sealskin float; strips of sealskin to hold spears, paddle, etc., run through bone leaders from side to side of canoe. Kaiak is made by covering a light wood form with sealskin.

Dimensions of kaiak.—Length over all, 19 feet 9 inches; width, 20¼ inches; paddle, 6 feet 8 inches; harpoon, 9 feet 7 inches. Scale of model, 2 inches equal 1 foot.

Transferred from State Department. Cat. No. 76,593 U.S.N.M

Model of kaiak.

Type used by the Greenland Eskimo for hunting seals, walrus, sea birds, etc. A keelless skin canoe; long, very sharp, strongly raking ends, the points tipped with bone, and stem and stern shod with bone from top to some distance beneath bottom; rising floor; nearly vertical sides; flat deck; circular manhole in center with rim of wood; equipped with bone-tipped double-bladed paddle, harpoon, lance, throwing stick, etc.

Dimensions of model.—Length, 16 feet 6 inches; width, 21 inches; depth, 9 inches; paddle, 6 feet; harpoon, 7 feet 3 inches; lance, 5 feet 6 inches. Scale of model, 2 inches equal 1 foot.

Deposited by Mrs. M. M. Hazen. Cat. No. 129,813 U.S.N.M.

Model of kaiak.

Type used by the Eskimo of Greenland for hunting seals, walrus, sea birds, etc. A keelless, double-ended, skin canoe; long, very sharp, strongly raking ends, with acorn-shaped bone ornament at each extremity and shoe of bone extending from top of bow and stern to some distance beneath the bottom; rising floor; flaring sides;

flat deck; manhole in center, with waterproof skin garment worn by Eskimo kaiakers fastened around its rim. Kaiak made by covering light wood frame with sealskins sewed together with sinews.

Dimensions of kaiak.—Length over all, 18 feet 7 inches; width, 21⅗ inches; depth, 11 inches; paddle, 7 feet 5 inches; harpoon, 7 feet 9⅗ inches; lance, 7 feet 1 inch; bird spear, 5 feet 7 inches. Scale of model, 2½ inches equal 1 foot.

Deposited by Mrs. M. M. Hazen. Cat. No. 129,814 U.S.N.M.

Model of kaiak.

Type used by the Eskimo of Tusiak, North Greenland, for hunting and fishing. Made of seal skin stretched over a light wooden frame, and securely fastened around the manhole; entirely covered, except the manhole where the Eskimo sits; long, sharp, overhanging, pointed ends, tipped with bone knob, and with a bone shoe or cutwater extending from the extremity to the bottom; rising floor; flaring sides; rather straight on top; fitted with thongs of seal skin passing through bone leaders and so arranged as to hold spears and other equipment; figure of Eskimo seated in manhole, with waterproof garment tied around rim of manhole and double-bladed paddle in hands.

Dimensions of kaiak.—Length, 17 feet 3 inches; width, 2 feet; depth, 10 inches; paddle, 6 feet long. Scale of model, 1⅓ inches equal 1 foot. Cat. No. 14,150 U. S. N. M.

BIRCH-BARK CANOES.

Birch-bark canoe.

Used by the Passamaquoddy tribe of Indians, near Eastport, Me. A sharp-ended, round bottom, keelless canoe with tumble-home top sides; curved ends; good sheer; open, five gunwale braces, made of birch bark sewn together and stretched over a light wooden frame, being sewed with root fiber at the ends and around the gunwales.

Dimensions of canoe.—Length, 19 feet 8 inches; beam, 3 feet; depth, 13 inches. Cat. No. 160,340 U. S. N. M.

Birch-bark canoe.

Used by Ojibwa Indians of Wisconsin. An open, sharp-ended, round bottom, keelless canoe; ends turned up and curved inward; false gunwales nailed on; two single-bladed paddles with oar-shaped blades.

Dimensions of canoe.—Length, 13 feet; beam, 3 feet; depth, 10½ inches.

Collected by W. J. Hoffman. Cat. No. 168,192 U.S.N.M.

Birch-bark canoe.

Type used by the Tinneh Indians for traveling, hunting, and fishing on the rivers of northern Alaska. It is made of birch bark, which covers a light wooden frame and is held to the gunwales by lashings of root fiber; seams pitched. The canoe has long, sharp, raking ends; flat bottom; flaring sides; and a deck at one end for a length of 5 feet; four gunwale braces.

Dimensions of canoe.—Length, 18 feet; beam, 26½ inches; depth, 12½ inches.

Collected by J. Henry Turner. Cat. No. 166,934 U.S.N.M.

Birch-bark canoe.

Type used by the Kootenay Indians of Washington State. It is made of a light wooden frame covered with spruce bark. Bow and stern are alike and terminate in ram-shaped points on a line with the bottom of the canoe; flat bottom; straight sides.

Dimensions of canoe.—Length, 15 feet 7 inches; beam, 21½ inches; depth, 13 inches; oval opening in top, 9 feet 3 inches long.

Collected by Amherst W. Barber. Cat. No. 204,584 U.S.N.M.

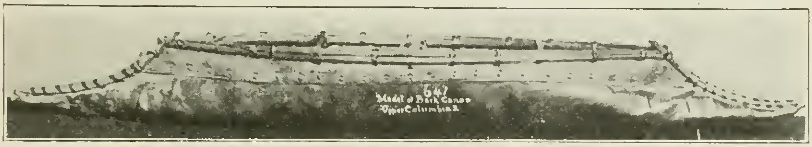


FIG. 63.—KOOTENAY INDIAN SPRUCE-BARK CANOE.

Model of birch-bark canoe.

Used by Indians on the rivers of northern Alaska. A covering of birch bark is stretched over a light wooden frame, and lashed over the gunwales with fiber of cedar roots. The canoe is open, with sharp, overhanging, pointed ends, flat bottom, and flaring sides.

Dimensions of canoe.—Length, 17 feet 9¾ inches; width, 3 feet ⅝ inch; depth, 17½ inches. Scale of model, 2½ inches equal 1 foot.

Deposited by the Bureau of Fisheries. Cat. No. 76,278 U.S.N.M.

Model of birch-bark canoe.

Used for hunting and fishing by the Indians on the rivers emptying into Bristol Bay, Alaska. An open, sharp-ended, round-bottom, keelless canoe; made by covering a light wood frame with birch bark sewn together with root fiber and lashed over gunwales with same material; seams and joints covered with pitch.

Dimensions of canoe.—Length, 17 feet 4 inches; width, 4 feet 8 inches; depth, 3 feet 6 inches. Scale of model, three-fourths inch equals 1 foot. Cat. No. 55,906 U.S.N.M.

Model of birch-bark canoe.

Used for hunting and fishing by the Indians on Uluk River, above Norton Sound, Alaska. An open, sharp-ended, flat-bottom canoe, with flaring sides; high ends; three thwarts or gunwale supports; made by covering light wood frame with birch bark fastened to gunwales with root fiber.

Dimensions of canoe.—Length over all, 17 feet 2 inches; beam, 3 feet 5 inches; depth, 19 inches. Scale of model, $1\frac{3}{4}$ inches equal 1 foot.

Cat. No. 32,991 U.S.N.M.

Model of birch-bark canoe.

Used by natives of Norton Sound, Alaska. An open, round-bottom, keelless canoe, with long sharp ends; curved and raking wooden stem and sternpost, which project above gunwales; canoe straight on top, except at ends, which curve abruptly upwards; 3 cross bars or gunwale supports; fitted with single lanceolate-bladed paddle. Canoe made by covering a light wooden frame with breadths of birch bark sewed together with root fiber and secured to ends and gunwales with same material.

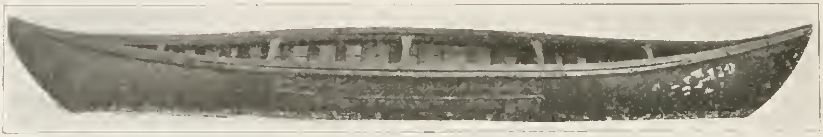


FIG. 64. CANADIAN BIRCH-BARK CANOE.

Dimensions of canoe.—Length over all, 18 feet 8 inches; width, 4 feet; depth, 18 inches; paddle, 6 feet 4 inches. Scale of model, $1\frac{1}{2}$ inches equal 1 foot.

The frame is quite different from that of the birch-bark canoes made by the Indians in the eastern United States and those of the Great Lakes region. In the latter the frame is very thin and so nearly covers the entire interior of the canoe that it may almost be considered an inside skin. The frame of this Alaskan canoe is in narrower and relatively thicker pieces, placed much wider apart, and in its arrangement shows some affinity to the framework of the kaiak or oomiak.

Cat. No. 32,992 U.S.N.M.

Model of birch-bark canoe.

Built and used by the Mic Mac Tribe of Indians, lower Canada. These canoes are employed in fishing, hunting, etc.

An open, round-bottom, sharp-ended canoe, with recurved sheer; five gunwale supports or thwarts; made by covering a light wooden frame with breadths of birch bark sewed together with root fiber;

also sewed at ends and attached to gunwales with same material; seams covered with pitch; wooden strip nailed to top of gunwales to protect fiber seizings from wear.

Dimensions of canoe.—Length, 21 feet 3 inches; width, 3 feet 5½ inches; depth, 22 inches. Scale of model, 2¼ inches equal 1 foot.

Cat. No. 55,814 U.S.N.M.

BALSAS AND DUGOUTS.

Model of tule grass balsa.

Used by the Indians on Pyramid Lake, Nev.

Dimensions of balsa.—Length, 17 feet; width, 5 feet 4 inches; height, amidships, 2 feet. Scale of model, 1½ inches equal 1 foot.

Cat. No. 19,028 U.S.N.M.

Grass boat or balsa.

Used by the Seri Indians of Mexico. This boat was obtained on Thuron Island, Gulf of California.

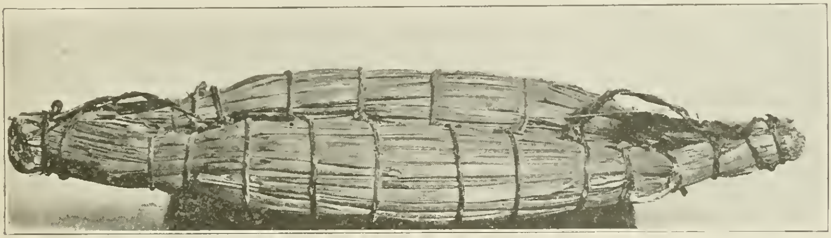


FIG. 65.—TULE GRASS BALSA.

The boat is almond-shaped with very tapering ends, and is made up of three bundles of reeds lashed together. The center bundle is about 10 feet long, and the two outer bundles are 27 feet long, while the greatest width at the center is 3 feet.

Gift of Bureau of American Ethnology. Cat. No. 160,391 U.S.N.M.

Model of dugout canoe.

Used by the Hupa Indians, Trinity River, Calif., for crossing the river. Roughly made, open, square-ended, screw-shaped dugout; round bottom; gunwales curve inboard; ends rise nearly to point in middle.

Dimensions of dugout.—Length, 9 feet 8 inches; width, 6 feet; height, amidships, 2 feet; at ends, 5 feet. Scale of model 1½ inches equal 1 foot.

Collected by S. Powers. Cat. No. 21,359 U. S. N.M.

Dugout canoe.

Used by the Menomoni Indians of Wisconsin. An open, sharp-ended, round bottom, keelless dugout canoe, characteristic of the western Lake region.

Dimensions of canoe.—Length, 19 feet 9 inches; beam, 21½ inches; depth, 12 inches.

Collected by W. J. Hoffman. Cat. No. 76,313 U.S.N.M.

Dugout canoe.

The Indians used this type of canoe for crossing the Pamunkey River, etc., in Virginia. It is a small dugout with an open, double-ended, round bottom; keelless; with full convex raking ends; inside burned out; equipped with two lanceolate bladed paddles.

Dimensions of canoe.—Length, 8 feet 10 inches; beam, 18 inches; depth, 9 inches; paddles, 4 feet 8 inches long.

Made and presented by Terrel Bradley, a Pamunkey Indian.

Cat. No. 165,450 U.S.N.M.

Dugout canoe.

Used by the Indians in southeastern Alaska for traveling, etc. Dug out of the trunk of a single tree of the giant cedar (*Thuya gigantea*). An open, round bottom, keelless canoe, long, sharp, overhanging bow, with snout-like projection and straight nearly vertical cutwater; flaring sides; sharp, overhanging stern; ends curved up rather sharply, with a carved figure of a bear resting on the bow and stern; painted all over with totems; equipped with five paddles.

Dimensions of canoe.—Length, 44 feet 5 inches; beam, 5 feet 10 inches; depth, 2 feet 8 inches.

Elliott makes the following reference to canoe building in southern Alaska:

"But the one thing of joy, of delight, and of infinite use to the native of the Sitkan archipelago is his canoe. Life, indeed, would be a sad problem for him were it not for this adjunct of his own creation. Upon its construction he lavishes the best of his thought, the height of his manual skill, and his infinite patience. The result of this attention is to fashion from a single cedar log a little vessel which challenges our admiration invariably for its fine outline and its seaworthiness and strength.

"All the canoes of this region have a common model, and are similar in type, though they differ much in details of shape and size. They are all made from the indigenous pine and giant cedar, the wood of which is light, durable, and worked very readily, but it is apt to split parallel to its grain. This constitutes the only solicitude of the Indian's mind. He keeps the canoe covered with mats and brush whenever it is hauled out, even for a few days, to avoid this danger, for whenever a canoe is heavily laden, and working, as it will do, in a rough channel, it is in constant danger of splitting at the cleavage lines of its grain, and thus jeopardize its living as well as dead freight.

"With an exception of the bow and stern pieces, each canoe, no matter how large or how small, is made in the same manner and from a single log, which is roughed out in the forest, then towed around to the permanent village, where it is hauled up in front of the architect's house. Here he works upon it during winter months, usually in odd hours, employing nothing but his little adz-like hatchet and fire to assist in giving it shape and fine lines. The requisite expansion amidships, to afford that beam required, is effected by steaming with water and hot stones and the insertion of several thwart sticks. Canoes are smoothed outside and painted black, with a red or white streak under the gunwale in most cases; inside they bear the regular fine tooth marks of the excavating adz and are smeared with red ocher. The paddles are usually made of yellow cypress, and a great variety of small wooden baling dippers are also provided, one or two for each canoe, because the water often slops over the gunwales in bad weather. The canoe itself is never suffered to leak. The average size is one of 15 to 20 feet in length, which will carry from 8 to 10 savages with baggage. One having a length of from 30 to 35 feet carries as many men. The smaller canoes, of from 12 to 13 feet, are usually used by one or two savages in their quick, irregular trips to and from the village, and are easily launched and hauled by one man."[15]

Collected by F. W. Clark. Cat. No. 76,315 U.S.N.M.

Alaskan dugout canoe.

The Indians of Alaska use this type of canoe for traveling, fishing, and hunting. It is dug out of a single log of yellow cedar (*Thuya gigantea*). It has a long, sharp, overhanging bow, with nearly vertical cutwater, or stem, below; narrow, flat bottom; round bilge; flaring sides; sharp, strongly raking stern; fair sheer; open.

Dimensions of canoe.—Length over all, 27 feet 1 inch; beam, 3 feet 10 inches; depth, 17 inches. Cat. No. 160,335 U.S.N.M.

Model of dugout canoe.

Used by the Indians at Sitka, Alaska, and vicinity. It is the same type as the canoes of British Columbia. An open, round-bottom, keelless dugout canoe; flaring sides; long, sharp, overhanging, flaring bow, with hollow water lines; upper part of bow nearly V-shaped in cross section; cutwater almost vertical; long, sharp, strongly raking stern; much sheer; four thwarts; also supplementary crosspiece, flush with gunwales, directly above the forward thwart. Ornamented with painted totems.

---

[15] Our Arctic Province, pp. 62–63.

Dimensions of canoe.—Length over all, 31 feet 8 inches; beam, 7 feet; depth, 19 inches. Scale of model, 1½ inches equal 1 foot.

Collected by J. J. McLean. Cat. No. 63,557 U.S.N.M.

Model of dugout canoe.

Built by the Indians of southeastern Alaska. This is a model which has just been completed with exception of painting. An open, keelless dugout canoe, with narrow, flat bottom; round bilge; flaring sides; sharp, raking ends; strong sheer, especially at ends; three thwarts, the forward one with mast hole.

Dimensions of canoe.—Length over all, 16 feet 8 inches; beam, 5 feet 2 inches; depth, 22 inches. Scale of model, 1½ inches equal 1 foot.

This model is inaccurate in proportion, being too wide and deep for its length. Cat. No. 73,558 U.S.N.M.

Model of dugout canoe.

Used for fishing by the Haida Indians of the northwest coast of America. An open, flat-bottom, keelless dugout canoe, with flaring sides; high, sharp, projecting ends, the bow terminating in a carved beak of a bird; hollow water lines; strong sheer. Design of carving and painting to represent totem of the crane ("Tatl").

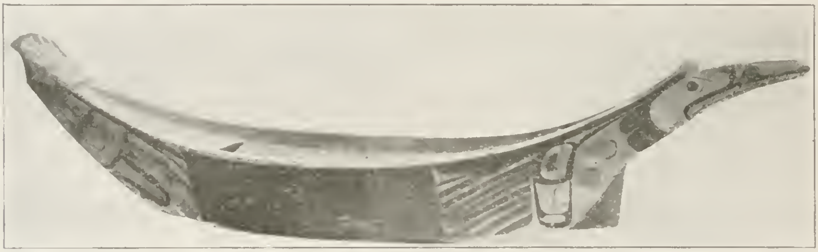


FIG. 66.—HAIDA INDIAN DUGOUT CANOE.

Dimensions of canoe.—Length over all, 24 feet 7½ inches; beam, 5 feet 8 inches; depth, 2 feet 3 inches. Scale of model, 2 inches equal 1 foot. Cat. No. 72,685 U.S.N.M.

Model of dugout canoe.

Used by Indians on the northwest coast of America for traveling, hunting, fishing, etc. An open keelless dugout; painted; sharp, high, projecting ends; round bilge; narrow, flat floor; much sheer on top; three thwarts, forward one with mast hole; two paddles, with spear-shaped blades and crossbar handles.

Dimensions of canoe.—Length over all, 26 feet 6 inches; on bottom, 15 feet; beam, 5 feet 6 inches; height, amidships, 2 feet 9 inches; at ends, 5 feet 6 inches. Scale of model, 1 inch equals 1 foot.

Collected by Wilkes Exploring Expedition.

Cat. No. 2,583 U.S.N.M.

Model of dugout canoe.

Dugout used in sea fishing and whaling by the Haida Indians of the northwest coast of America. An open, sharp-ended, keelless dugout canoe, with long, sharp, overhanging bow; cutwater nearly vertical; narrow flat bottom, tapering to point at ends; strongly flaring sides; sharp overhanging stern; strong sheer; painted black with red stripe in midship section, and with totems at ends; equipped with lanceolate-bladed paddles, four thwarts, etc.

Dimensions of canoe.—Length, 36 feet; beam, 6 feet; depth, on side, 25 inches; paddles, 8 feet 9 inches to 9 feet 9 inches long. Scale of model, 1 inch equals 1 foot.

Collected by George Gibbs. Cat. No. 639 U.S.N.M.

Dugout war canoe.

Made by Nookta Indians, of Vancouver Island, British Columbia, from a single log of yellow cedar (*Thuya gigantea*). An open, round bottom, keelless dugout canoe; long, very sharp, overhanging bow, with beaklike projection; flaring sides; long, sharp, nearly vertical stern, rising in a knob-like projection above the gunwale; rather straight on top except at bow, which has a strong upward curve; painted totems of various colors at bow and stern.

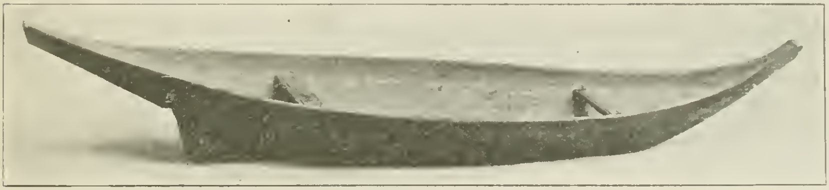


FIG. 67.—HAIDA INDIAN DUGOUT CANOE.

Dimensions of canoe.—Length, 59 feet; beam, 8 feet; height, bow, 7 feet 3 inches; stern, 5 feet 3 inches; amidships, 3 feet 7 inches.

This canoe, which is of the so-called Chinook model, was made for Moquilla, a Nootkan chief and grandson of Moquilla, mentioned by Meares, Vancouver, and others; it was given by him to a Nimpkish chief residing at Alert Bay near Fort Rupert on the northeastern coast of Vancouver Island. It was shaped and hollowed out with axes and rude implements made by the Indians; the requisite flare or beam being secured by filling the canoe with water which is heated by means of red-hot stones, and a slow fire made on the outside by rows of bark laid on the ground a short distance off, but near enough to warm the cedar without burning it; this rendered the wood flexible and stretchers, similar to a boat's thwarts, increased the width from 8 to 12 inches.

The largest of these canoes are capable of carrying 100 persons with all their equipment.

It is said that from the model of these Chinook-shaped canoes, brought to Boston and New York by early fur traders, the idea of our modern clipper ships was first obtained.

The magnificent proportions of this canoe can be better understood when it is stated that it is 19 feet longer than the *Sparrow Hawk*, an English vessel which brought settlers to America in 1626. It is also considerably longer than the "pinkies" built for the New England fisheries from 1820 to 1845. A portion of this canoe may be seen at the upper margin of the Frontispiece.

Collected by J. G. Swan. Cat. No. 26,785 U.S.N.M.

PART 2.

DESCRIPTION OF VESSELS AND BOATS OF SOUTH AMERICA.

Model of Brazilian dugout canoe.

Dugout canoes of this type vary from 21 to 28 or 30 feet in length. They are used at Bahia, Brazil, for fishing about the harbors or near the land, but more especially as tenders to the jangadas or catamarans that go to sea on fishing cruises and are met on their return by these canoes, which buy the fish and carry them to market, the catamarans seldom going up the harbor.

This dugout is made of wood with a flat bottom; strong rake; scoop-shaped bow; rounded sides, tumbling in considerably at the top; and a square V-shaped stern, with a long overhang and no skag. The canoe is rather straight on top except at the ends, where it curves up sharply, the bow ending in a point made to imitate a stem. It is fitted with two thwarts, one well forward and the other amidships, through which the masts are stepped. She is lateen rigged and carries two sails set on long yards, which are hoisted on the short masts, the latter having a strong rake forward. There is one steering paddle with a lanceolate blade.

The peculiarity of canoes of this type is that each mast is provided with one or more ropes having loops in the lower ends. When there is a fresh breeze, one or more of the crew put the loop over them, beneath their arms, and, placing their feet against the weather gunwale, shove themselves out as far as possible to windward to increase the stability of the boat.

Dimensions of canoe.—Length over all, 28 feet; beam, 4 feet; depth, 2 feet. Scale of model, one-half inch equals 1 foot.

Collected by the Bureau of Fisheries. Cat. No. 76,090 U.S.N.M.

Model of Brazilian jangada.

A catamaran, locally called "jangada," is used in navigating along the shallow coasts of Brazil and for fishing. It is made of six logs of buoyant wood, of varying sizes, each log pointed at both ends and fastened together with logs secured by wooden tree nails. The raft is fitted with a rude platform and seats, and arched over with a mat roof; also with an elevated seat for the steersman.

Dimensions of jangada.—Length, 17 feet 3 inches; width, 5 feet 3 inches; mast, 13 feet 1½ inches; boom, 10 feet 6 inches. Scale of model, two-thirds inch equals 1 foot.

Collected by S. D. Trenchard. Cat. No. 15,139 U.S.N.M.

Model of British Guiana dugout canoe.

This is a peculiar type of dugout "piragua," or canoe, used by the Caribs of British Guiana. A section of a tree is hollowed out thin and the sides spread apart by seven crossbeams resting upon and lashed to each gunwale; the excavation is continued the entire length, leaving the ends open. These are filled by V-shaped cross sections fitted into the ends and pitched to make the seams tight. These square ends extend some distance above the gunwales.

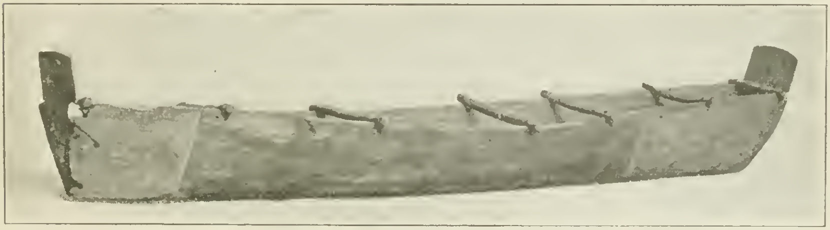


FIG. 68.—BRITISH GUIANA DUGOUT CANOE.

Dimensions of canoe.—Length, 18 feet 10 inches; beam, 3 feet 8 inches; depth, 18 inches; paddles, 6 feet 5 inches. Scale of model, 1⅓ inches equal 1 foot.

Gift of Rev. J. Cullen. Cat. No. 4,339 U.S.N.M.

Model of Fuegian canoe.

This is a type of canoe used by the native Indians in the Strait of Magellan. It is made of coarse bark sewed together with whalebone and fastened to an inner frame. The frame consists of a rather slim rounded gunwale, on each side, to which are secured splints made by splitting saplings or branches of trees, which are bent round in a bow shape, as required, to give the proper shape to the boat. The gunwales are supported and kept in proper position by five cross bars, which are lashed to it with whalebone and serve the purpose of thwarts. The covering, or skin of the boat, is fastened to the gunwales with whalebone. The canoe has a round bottom, flaring sides, and a very strong camber, both ends being sharp and rising to a point from beneath; it has considerable sheer on top.

The form of this canoe is almost precisely like that of a fishing boat used at Jessor, in the Bengal Presidency, India. It has two rude lanceolate-shaped paddles with very short handles, a harpoon such as is used by the Fuegians, and a model of a grass basket which is made by "half-hitching."

Dimensions of canoe.—Length, 25 feet 6 inches; beam, 6 inches; depth, 20 inches; paddles, 7 feet 4 inches and 7 feet 10 inches long, respectively. Scale of model, 1½ inches equal 1 foot.

Deposited by the Bureau of Fisheries. Cat. No. 76,091 U.S.N.M.

South American bark canoe.

A type of canoe used by the Indians on the rivers of northern South America. It is made of thick bark from the trunk of a large tree, the bark being brought together at the ends and kept apart in the middle with wooden spreaders. The bark is rolled or folded together at the ends while green and is held by lashings. This gives shape to the canoe, making the ends sharp and raising them sufficiently to be above the water when the boat is afloat. After the bark dries the lashings are removed. If necessary, the openings at the ends are filled with mud, which is allowed to bake in the sun.

Dimensions of canoe.—Length, 18 feet; width, 2 feet; depth, 9 inches.

No boat is more primitive than this. Canoes of similar construction and form are used by the native Australians.

Cat. No. 160,359 U.S.N.M.

Model of Peruvian grass boat, or balsa.

This type of boat is made and used by the Amara Indians for fishing and transportation on Lake Titicaca, Peru. Ordinarily it is propelled by paddling. When rigged with a sail it is steered with a short oar, the Indian sitting astride the after part of the balsa.

A grass balsa made of four cigar-shaped bundles of dried reeds, each firmly bound together and to each other; the two lower bundles much the largest in diameter, with ends curved up; the upper bundles laid horizontally on the outward upper sides of the bottom ones, and so lashed as to leave a longitudinal hollow for the entire length of the boat. Mast made of two pieces like a pair of shears, with their upper ends lashed together, their lower ends divided, resting on the top bundles of the balsa, and held by lashings. The mast is supported or stayed by another pole, three-pronged at its upper end, the foot of which rests near the stern of the boat, while its upper end is seized to the spars, with which this brace stands at an angle of about 45°. A lugsail with yard on top and bottom is carried. This is made by lashing together the ends of reeds, and serves the purpose when going before the wind.

Dimensions of balsa.—Length, 17 feet 2 inches; width, extreme, 4 feet 4 inches; depth, 2 feet 7 inches; mast, above top of balsa, 10 feet 5 inches; sail, head, 8 feet 10 inches; luff, 3 feet 4 inches; leach, 11 feet 8 inches. Scale of model, 3 inches equal 1 foot.

A catamaran is sometimes made by combining two of these boats 2 or 3 feet apart, and occasionally an outrigger similar to that adopted by the Hawaiian and Polynesian islanders is used. Untanned leather thongs generally compose the fastening, although grass rope is braided for halyards, stays, etc.

Gift of C. H. Harlow. Cat. No. 76,316 U.S.N.M.

PART 3.

DESCRIPTION OF VESSELS AND BOATS OF EUROPE.

Irish curragh.

This type of boat is built and used by fishermen on the west coast of Ireland. It is an open, round-bottom, keelless boat, with full round bow and square stern, made by covering a frame of willow withes with tarred canvas, the frame consisting of a stout and roughly made wooden gunwale, to which is fastened the basket-like bottom over which the canvas is spread.

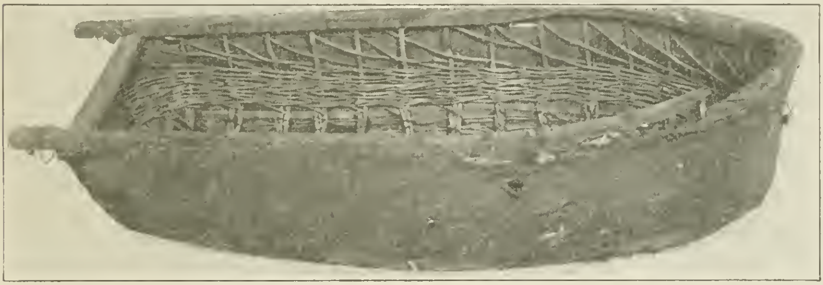


FIG. 69.—IRISH "CURRAGH."

Dimensions of curragh.—Length, 7 feet 10 inches; beam, 3 feet 4 inches; depth, 25 inches.

Boats of this type were much in favor on certain parts of the coast of Ireland where the fishermen are not able to furnish themselves with more expensive craft. The boats were often from 18 to upwards of 20 feet in length and 4 or 5 feet beam; they float like a bubble on the water, and so long as they do not come in contact with anything to injure the cover are considered safe and seaworthy.

"The curragh differs slightly in shape in different islands, being sometimes long and somewhat narrow, but generally very broad and flat bottomed, without much sharpness of shape even in the bows, where the wooden frame of the gunwale comes to a point, while it is cut square at the stern. It is necessary to exercise caution in launching or beaching a curragh, for the bottom consists merely of a framework of light laths bent from side to side of the boat and covered with canvas smeared with pitch. This most primitive form of boat justifies its survival in the nineteenth century partly by the convenience for launching and landing of its light weight—one man can lift it—partly by the cheapness and simplicity of its materials and making, but chiefly by its remarkable faculty of riding safely over the Atlantic rollers in rough weather when no ordinary boat could live. The islanders venture in these frail canoes into the open Atlantic many miles from land, and so seldom do they fail to return in safety that they have ceased to take account of the danger, and would almost as soon venture out to sea in a curragh as in a hooker."[16] Cat. No. 160,154 U.S.N.M.

River Boyne coracle.

The coracle was quite extensively employed for salmon fishing on the River Boyne, Ireland. It is not much used now, since netting was prohibited in fishing waters after 8 o'clock in the evening.

It is an open, oval-shaped coracle, with sloping ends and round sides, made by covering a light frame with leather.

Dimensions of coracle.—Length, 5 feet 11 inches; beam, 3 feet 9 inches; depth, 17 inches.

Coracles of this description were formerly in favor for operating snap nets for the capture of salmon. Two coracles were worked together, with two men in each; in fishing, one man kneels in the front and paddles the coracle, while the other sits and holds the snap net, dragging it behind, in conjunction with the men in the second coracle. Cat. No. 160,356 U.S.N.M.

River Dee coracle.

This type of boat is used chiefly for salmon fishing on the River Dee, Scotland. It is an open, flat bottom, keelless coracle, with sloping, nearly square ends; tumble-in sides; one thwart near the middle; made by covering a light wooden frame with tarred canvas.

Dimensions of coracle.—Length, 4 feet 11 inches; beam, 37 inches; depth, 16 inches.

This cheaply constructed and exceedingly light coracle is adapted to crossing streams, and is especially in favor among poachers, who carry on illicit fishing at night for salmon or other species.

Cat. No. 160,355 U.S.N.M.

Block model of ironclad ram.

The armored ram *Dunderberg* was built from this model by William H. Webb, at New York, in 1866. She was subsequently sold to France. She was armed with four 15-inch and twelve 11-inch smooth-bore guns. Her armor was 4½ inches thick. She was one of the first armored vessels to be provided with a ram.

---

[16] Pictorial World.

The model represents an iron, keelless ship, with long sharp bow, terminating in a pointed ram; bottom flat or nearly so; sides sloping; easy run; flat overhang, aft, as on early built monitors; armored citadel above deck, with sloping sides and ends, the latter being square; guns mounted in this citadel, and projecting through portholes.

Dimensions of vessels—Length, extreme, 377 feet 4 inches; beam, extreme, 72 feet 10 inches; depth of hold, 22 feet 10 inches; draft of water, 20 feet; tonnage, 5,000. Scale of model, one-third inch equals 1 foot.

The *Dunderberg* was a formidable vessel when built; she sat low in the water and only the sloping sides of her armored citadel presented much of a target for an enemy's shot. Her sides were 5 feet thick, plated with iron armor; her guns carried 500-pound shells, and she was driven 15 knots an hour by an entirely concealed force of 1,200 horsepower. She was launched July 22, 1865, and completed the following year.

Gift of William H. Webb. Cat. No. 160,138 U.S.N.M.

Model of German fishing vessel.

Boats of this class are used in the North Sea long-line fishery for haddock, etc., from the Frisian Islands, off the west coast of Germany, and especially from the island of Nordernei. They range from 35 to 45 feet in length. Although nearly scow-shaped, they have a local reputation for speed. Doubtless they run fast before the wind, as their displacement is small, and, with their big leeboards, may do fairly well close hauled in smooth water, as compared with some other styles of German fishing boats.

The model represents a wooden, carvel-built, scow-shaped vessel. Outside planking and framework of oak; pine deck and spars; painted black below the water line, bright about; decked; low, heavy bulwark; cockpit for helmsman; small, old-style windlass; heavy leeboards. The model is peculiar in form. It is shallow and moderately wide; has a fine sheer; long, straight side; round bilge; low, flat floor; very little keel; bluff, rounding (almost square) ends, that have a great deal of rake or flare below deck, but tumble in above; curved stem; straight sternpost; rudder hung outside; steers with tiller; yawl rig; a very tall pole mainmast a little more than one-third of boat's length from stem; small "jigger" mast stepped in a wooden horse that extends from side to side, aft. A permanent wire forestay sets up at the stem head. A long spar is used for a bowsprit when "by the wind," but it is run out to windward like a spinnaker boom, and the sail set on it when "going free." Carries five sails—jib, stay-foresail, loose-footed mainsail, small square-headed gaff-topsail, and jigger sail.

Dimensions of vessel.—Length over all, 38 feet 6 inches; on keel, 35 feet 9 inches; beam, 11 feet 11 inches; depth of hold, 4 feet 3 inches; bowsprit, 38 feet; mainmast, deck to truck, 41 feet 6 inches; main gaff, 12 feet 9 inches; gaff-topsail yard, 7 feet 3 inches; jigger mast, 15 feet 7 inches; boom, 6 feet; gaff, 2 feet 9 inches. Scale of model, 1 inch equals 1 foot. Cat. No. 55,782 U.S.N.M.

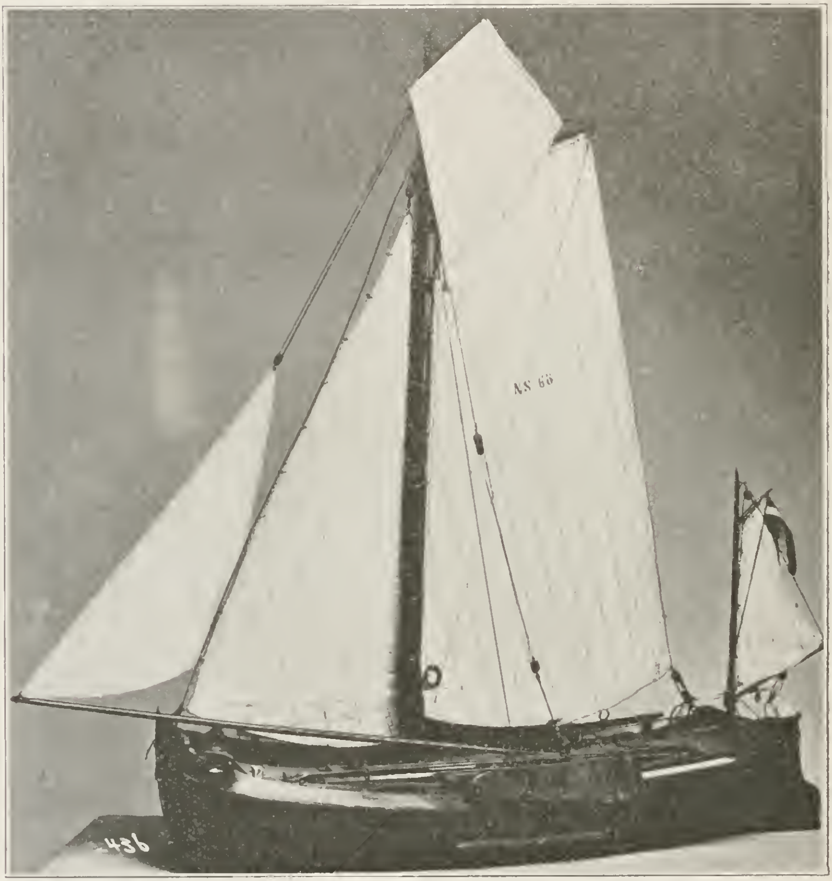


FIG. 70.—GERMAN FISHING VESSEL "CATHARINA VON NORDERNEI."

Model of German smack.

A welled vessel used in the market fisheries of the Baltic Sea, the fish being carried alive to the market towns on the coast of Germany.

This is a wooden, carvel-built, flat bottom vessel, with convexly sharp bow; curved, strongly raking stem; bottom sharp at each end, with nearly vertical sides; holes along the sides in the center to admit water to the well; bilge keels; topside of vessel with convex lines like ordinary vessel; narrow square stern; strongly raking sternpost; rudder hung outside; decked; cockpit for steersman aft;

wooden binnacle forward of mizzenmast; large hatchway amidships; leeboards; winch aft of mainmast; hatch leading to forecastle forward of mainmast; large wooden funnel on port side of bow; metal rests on each side for pikes, trawl beams, etc.; old-fashioned windlass; fixed bowsprit; small boat on deck; ketch rigged, with tall mainmast and short mizzenmast; spars, standing and running rigging, complete; no sails bent. Beam trawl net triced up forward of mainmast; trawl head irons and bridles on deck aft of windlass.

Dimensions of vessel.—Length over all, 44 feet 5 inches; beam, 13 feet 2 inches; depth, 5 feet 2 inches; bowsprit, outboard, 13 feet 2 inches; mainmast, deck to hounds, 28 feet 9$\frac{3}{5}$ inches; deck to truck, 40 feet; main boom, 14 feet 9$\frac{3}{5}$ inches; main gaff, 14 feet; mizzenmast, deck to hounds, 19 feet 2 inches; deck to truck, 27 feet 7 inches; spanker boom, 12 feet; gaff, 7 feet 2 inches; length of trawl net, 32 feet; of beam, 22 feet 7 inches. Scale of model, five-eighths inch equals 1 foot. Cat. No. 55,784 U.S.N.M.

Model of German fishing boat.

This type of fishing boat, locally called "kurran kahn," a generic name derived from the net it operates, is quite extensively used in the fisheries of the "Haffa," or shallow sounds, which border the coast of Lithuania.

The model represents a wooden, carvel-built, flat bottomed, keelless, open boat, with high convex bow; wide bottom; little flare to side; moderately sharp stern (stem and sternpost inside wood ends); wide rudder, tiller chock across stern; strong sheer; platform over bottom; small decked cuddy forward; covered locker aft; one thwart to which mainmast is attached by metal bank; heavy, large leeboard attached by chain to after part of thwart; foremast goes through band at after part of cuddy; tall mainmast; sprit mainsail that reefs at the top (reef points at head of sail), laced to mast; small sprit foresail; small jib; iron-stocked anchor. Marked in mainsail "A. Gubbis.—Nedden No. 33."

Dimensions of vessel.—Length over all, 26 feet 6 inches; beam, 8 feet 3 inches; extreme width of bottom, 6 feet 6 inches; depth, 2 feet; mainmast, above thwart, 21 feet 6 inches; total 25 feet 6 inches; sprit, 21 feet 3 inches; foremast, 12 feet 6 inches; sprit, 9 feet; mainsail, 17$\frac{1}{2}$ by 8 feet; foresail, 8 by 3$\frac{1}{2}$ feet. Scale of model, 1 inch equals 1 foot.

The principal requirement of these boats is that they should draw little water, since the fishing ports and landing places along the entire coast of Lithuania are exceedingly shallow, the water often being only 1 foot deep; and in the northern part of the "Haff" there are many shoals that can not well be avoided. The main object is that the boats should be suitable for cruising and for casting the net even in stormy winds and choppy sea, conditions which determine the method of building. The boats are safe even in the shortest waves; they need no ballast, in fact, are better without it. The bottom is pine, 3 to 3½ inches thick. Side planked with oak, lower planks 2½ inches thick, gradually diminishing toward the top; upper plank 1¼ inches thick. The two small sails forward are believed to render better service than one large jib, and are preferred by the fishermen. These are taken in when it is necesary to shorten sail and the boat works under the sprit mainsail, which is used whole or reefed according to the strength of wind.

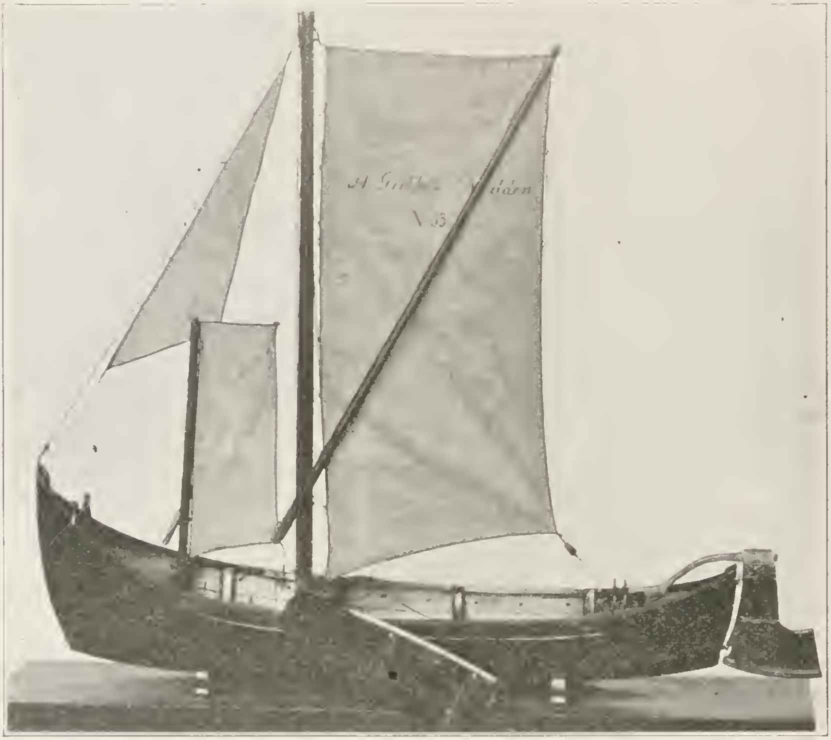


FIG. 71.—GERMAN KURRAN KAHN.

The trawl net "kurre" is 12 fathoms long; its mouth is 30 to 40 feet wide and 2 to 3 feet deep.

Cat. No. 55,790 U. S. N. M.

Model of Dutch fishing vessel.

A curious-decked vessel, of the type called "bombschuite," used for fishing from sections of the coast of the Netherlands where there are no harbors. It lands upon the beach when arriving from the fishing grounds, is hauled above the surf, if necessary, and is launched from the shore when going on a fishing trip.

A tub-shaped, clinker built, keelless craft; excessively wide and blunt, with bluff and almost square ends, tumbling in at top, curved and sloping below to join bottom; stem straight and slightly raking above water, strongly curved below; straight raking sternpost: large rudder hung outside: flat floor, with narrow flat section in middle projecting downward like a keel: short turn to bilge; slightly flaring side; heavy chock on bends for leeboard to rest against: fair sheer; fitted with beam trawl, wooden capstan for heaving in the nets; oars; two-flued and three-pronged iron anchors; fish bins, etc. It has a peculiar yawl rig seen nowhere else in the world, with hemp sails and mast jointed so that it can be lowered into the large stern crutch when the boat is engaged in the drift-net herring fishery.

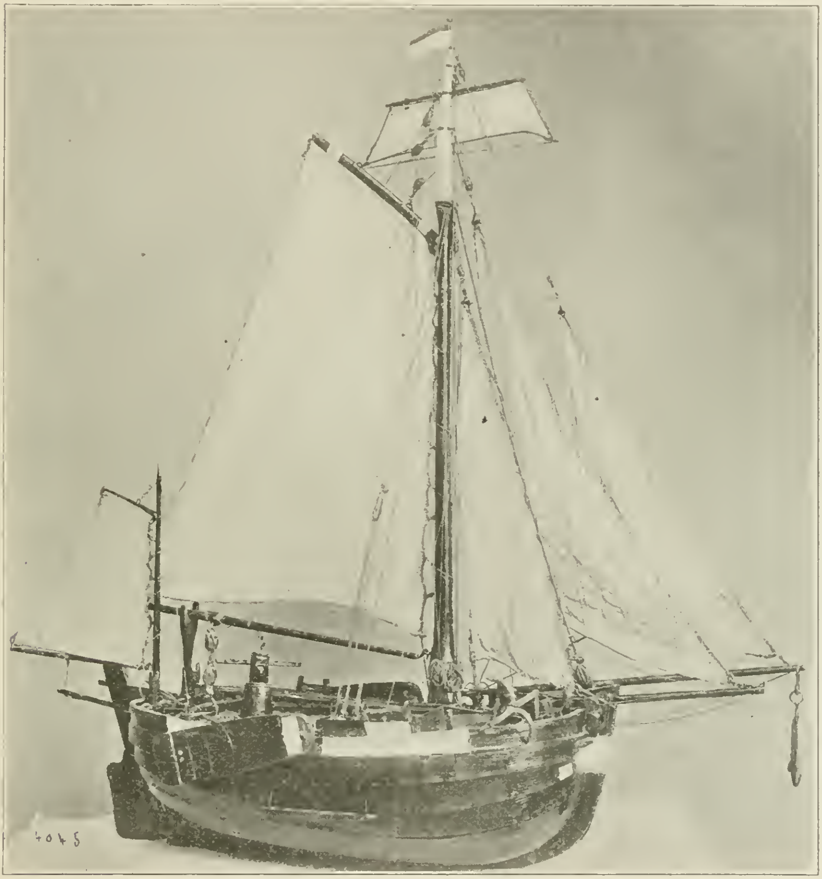


FIG. 72.—DUTCH "BOMBSCHUITE."

Dimensions of vessel.—Length, knightheads to taffrail, 32 feet; beam, 20 feet 6 inches; depth of hold, 7 feet 9 inches; bowsprit, outboard, 11 feet 3 inches; jibboom, total length, 24 feet; mast, deck to hounds, 35 feet 4 inches; total length, above deck 47 feet; main yard, 16 feet; topsail yard, 11 feet 4 inches; main boom, 24 feet 7½ inches; main gaff, 12 feet 1 inch; jiggermast, above rail, 16 feet 10 inches; boom, 11 feet 6 inches; gaff, 4 feet 6 inches; outrigger, outboard, 7 feet 1 inch; oars, 18 feet 6 inches; trawl beam, 20 feet long. Scale of model, 1 inch equals 1 foot.

Exchanged from Berlin Fisheries. Cat. No. 160,212 U.S.N.M.

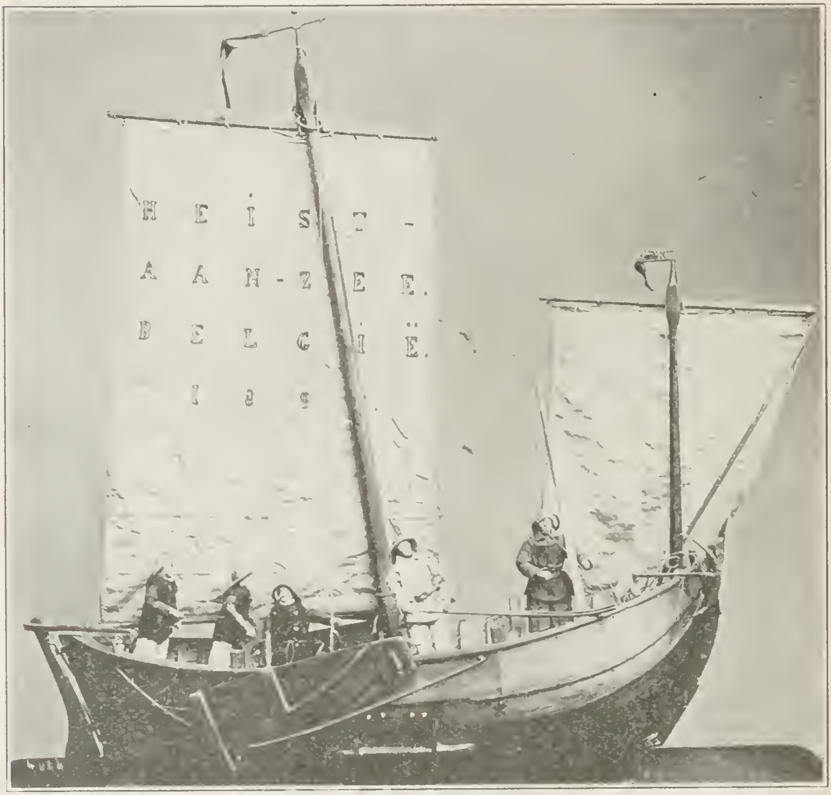


FIG. 73.—BELGIAN FISHING VESSEL.

Model of Belgian fishing boat.

This type of boat is used in the beam trawl fishery from the coast of Belgium. Boats of this kind are called sloops in Belgium. Their peculiar shape is no doubt due to the proximity of the Netherlands, as it is evident that they have been copied from small Dutch vessels which they resemble more or less.

The model represents an open, clinker-built, flat bottom keelless boat; high and very full bow; curved, moderately raking stem; round sides; easy bilge; narrow flat bottom; heavy cleat on bilge for leeboard to rest against; round and full stern, which is much lower than bow; straight raking sternpost; rudder hung outside; rigged with two masts, the foremast stepped at extreme bow and mainmast in middle; two square-headed lugsails, the forelug being small and loose-footed and the mainsail very large, with the foot extended by a sprit. Equipped with beam trawl, iron winch for heaving it in, figures of men, etc., to illustrate the fishery engaged in.

Dimensions of boat.—Length, overall, 41 feet 3 inches; beam, 18 feet 9 inches; depth, top of gunwale to garboard, 6 feet 9 inches; foremast, above gunwale, 18 feet 7½ inches; foreyard, 18 feet; foresprit (used to extend luff of sail) 19 feet 6 inches; mainmast, above gunwale, 38 feet 6 inches; main yard, 21 feet 6 inches; main (sprit) beam, 23 feet; trawl beam, 21 feet 3 inches long; sails: Mainsail, 30 feet high by 22 feet wide; foresail, 19 feet high by 17 feet, average width. Scale of model, 1 inch equals 1 foot.

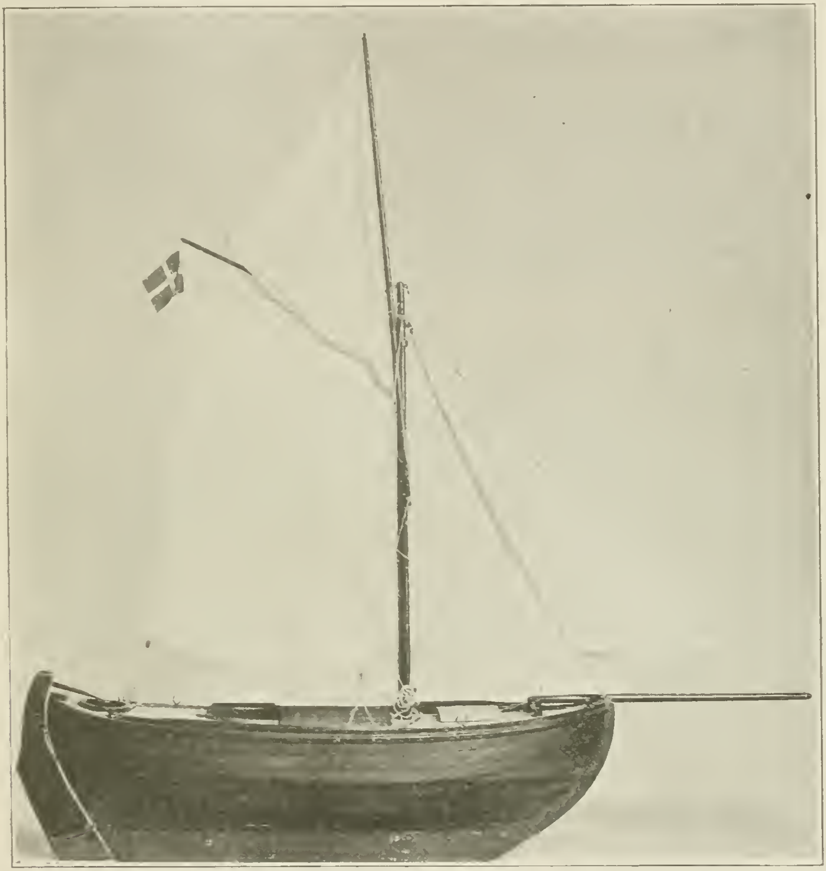


FIG. 74.—DANISH "SOUND" BOAT.

Cat. No. 160,213 U.S.N.M.

Model of Danish "sound fishing boat."

Boats of this type are used in the fisheries of the Kattegat and the "sound" (Oresmund), and are locally known as "sound" boats.

Craft of a similar model and rig, but open and of smaller size, are employed in the same fishery. The Snekkersteen boats range in size from 17 to 25 feet in length; they are fine sailers and excellent seagoing craft.

This is a wooden, decked, clinker-built, double-ended, keel boat, with sharp bow and stern; raking curved stem and sternpost; deep keel; hollow sharp floor; little sheer; cabin house amidships; cockpit abaft house; small steersman's cockpit aft; main hatch forward; cutter rigged with four sails—jib, stay-foresail, mainsail, and jib-headed gaff-topsail. It has two oars and boat hook.

Dimensions of boat.—Length over all, 25 feet; beam, 8 feet 11½ inches; depth of hold, 4 feet 4½ inches; extreme draft, 4 feet 7 inches; hatch, 2½ by 2½ feet; house, 5 by 5 feet; mast, above deck, 19 feet 2 inches; gaff-topsail pole, 21 feet 3 inches; oars, 15 feet; boat hook, 10 feet. Scale of model, 1⅓ inches equal 1 foot.

Boats of this class are framed and planked with oak, with pine deck. Cat. No. 55,789 U.S.N.M.

Model of Danish fishing boat.

Boats of this type are used in the inshore fisheries of Jutland, one of the northern Provinces of Denmark.

This is an open, clinker-built, double-ended, keel boat; sharp bow and stern; sharp floor; raking stem and sternpost; good sheer; sloop-rigged, with loose-footed sprit mainsail and jib, the latter tacking to stem head; four oars.

Dimensions of boat.—Length over all, 20 feet; beam, 6 feet 8 inches; depth, 2 feet 3 inches; mast, above thwart, 15 feet 5 inches; oars, 16 feet 8 inches. These boats are planked with oak, nine streaks on a side. Scale of model, 1⅓ inches equal 1 foot.

Gift of Arthur Feddersen. Cat. No. 76,006 U.S.N.M.

Block model of Russian steam frigate.

The wooden-screw steam frigate *General Admiral* was built from this model by William H. Webb at New York in 1858. She had 64 guns in broadside, and at that time was one of the largest and most powerful frigates in the world.

She was a wooden, single-screw, steam frigate, with sharp bow; moderately raking stem; rather low floor; wall side, tumbling in somewhat at top; easy run; nearly vertical sternpost; round stern; little sheer.

Dimensions of vessel.—Length over all, 316 feet 6 inches, on load water line, 302 feet 10 inches; beam, extreme, 54 feet 6 inches; depth, 34 feet; draft, 22 feet 9½ inches; tonnage, 4,600. Scale of model, one-third inch equals 1 foot.

The *General Admiral* was a ship-rigged vessel and carried a large area of canvas. She was a beautiful as well as a powerful vessel, and was considered a triumph of architectural skill. She was one of the last great wooden frigates built in the United States, since the engagement of the *Monitor* and *Merrimack* a few years later revolutionized the construction of war vessels and led to the substitution of iron and steel for wood.

Gift of William H. Webb. Cat. No. 160,139 U.S.N.M.

Model of a viking ship.

The original was exhumed at Gokstad, near Sandefjord, Norway, in 1880; supposed to have been buried as early as the ninth century. Vessels of this class and size were commanded by chieftains or vikings; they carried crews of 50 to 70 men—this one had 70 men—and were used chiefly for war purposes. When a chieftain died it was the ancient Norse custom to bury his ship with him, also other material that he had used.

It is a wooden (oak), clinker built, keel vessel, with long, symmetrically sharp ends, with wave-shaped water lines; stem and sternpost rise from keel with long, easy curve like the forward end of a sled runner and extend vertically some distance above the bow and stern; rising, slightly hollow, floor; flaring sides; straight on top in center, curving sharply upward at ends; low, movable deck laid in small sections and resting on timbers extending from side to side and terminating in knees which the planks are fastened to; row of 16 port holes on a side for oars; wooden shutters or valves on inside for closing the holes; 15 shields on a side hung outboard; rudder hung to starboard side of quarter; mast stepped in middle; no sail (a square-headed lugsail was probably carried).

The model is equipped with various things found with the ship, as follows:

Sharp-ended boat used for going to and from the larger vessel when she lay at anchor off the shore; sled made of wood and handsomely carved; two bedsteads; gang plank; verge boards or tent supports; side pieces to a seat of honor; implements the application of which is unknown, probably used for winding cords on them; wooden ladle; tiller; an ax of oak "excellently well made, of strongly marked iron-age type"; sliding covers to oar ports; two tables; two wooden plates; bottom of flat candlestick.

Dimensions of ship.—Length, 79 feet 4 inches; length of keel, 66 feet; beam, 16 feet 2 inches; depth, top of gunwale to bottom, 5 feet 7 inches; draft, amidships, 3 feet 7 inches; draft at ends of keel, 3 feet 2 inches; freeboard, 2 feet 11 inches; area of uppermost water line, 630 square feet; area of middle rib, 24 square feet; displacement, 959 cubic feet; number of oars on each side, 16; distance between oars, 3 feet; length of middle oar, 18 feet 6 inches; entire crew, 70; weight of crew with accoutrements, 10 tons; weight of ship and equipment, 22.02 tons. Scale of model, about three-fourths inch equals 1 foot.

This model was made in exact imitation of the original which was in a fair state of preservation when found. The vessel is remarkable for its symmetry.

Made in the Museum. Cat. No. 244.974 U.S.N.M.

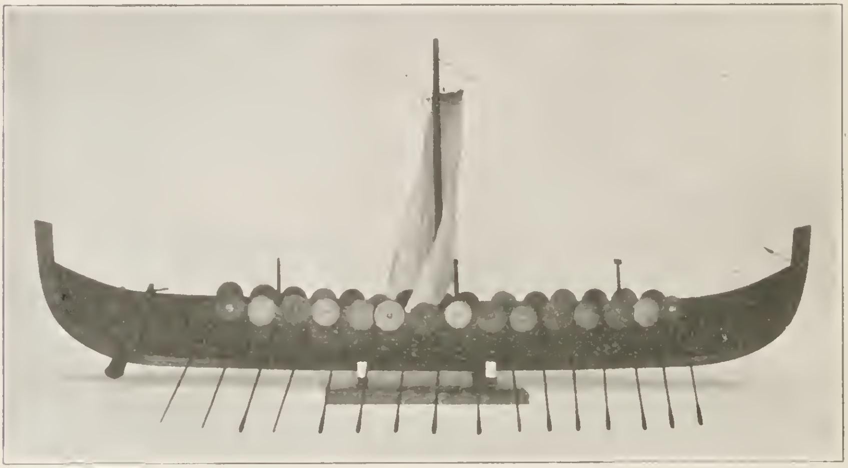


FIG. 75.—VIKING SHIP.

Model of Norwegian fishing vessel.

A type of vessel called "bankskiote," is employed in fishing for cod, etc., on the ocean banks off the west coast of Norway. Vessels of this class are the largest employed in fishing for food fish in Norway. They fish on the banks off Aalesund, near Cape Stat, where they anchor and set trawl lines. They vary in size from 60 to 80 tons. The average dimensions of one of these vessels are: Length, 61 feet; beam, $20\frac{1}{2}$ feet; depth, $8\frac{1}{10}$ feet.

This is a wooden, carvel-built, keel vessel, with full convex bow; curved, strongly raking stem; round bilge; flaring sides; short run; stern, full and round like the bow; moderately raking straight sternpost; rudder hung outside; medium sheer; decked; forecastle under deck forward; old style windlass, worked by hand spikes; large hatch amidships; cabin companionway on starboard side aft. Two casks, one on each side of bow. The rig is that known in England as the "dandy" or "ketch" rig, the mainmast, which stands forward, being much longer than the mizzenmast, which is aft. There are six sails—jib, stay foresail, mainsail (without boom), mizzen, or spanker, and two square-headed gaff-topsails. No hoops or hanks are used, the sails all being lashed to the masts and stays by a roving. Bowsprit ships out through iron band on top of bow, port side of stem.

Dimensions of vessel.—Length over all, 60 feet; keel, 34 feet; beam, 21 feet 6 inches; depth of hold, 7 feet 6 inches; bowsprit, outboard, 18 feet; mainmast, deck to hounds, 35 feet; deck to truck, 57 feet; main gaff, 18 feet; mizzenmast, deck to hounds, 29 feet; deck to truck, 45 feet; spanker boom, 19 feet; gaff, 14 feet. Scale of model, one-half inch equals 1 foot. Cat. No. 55,781 U.S.N.M.

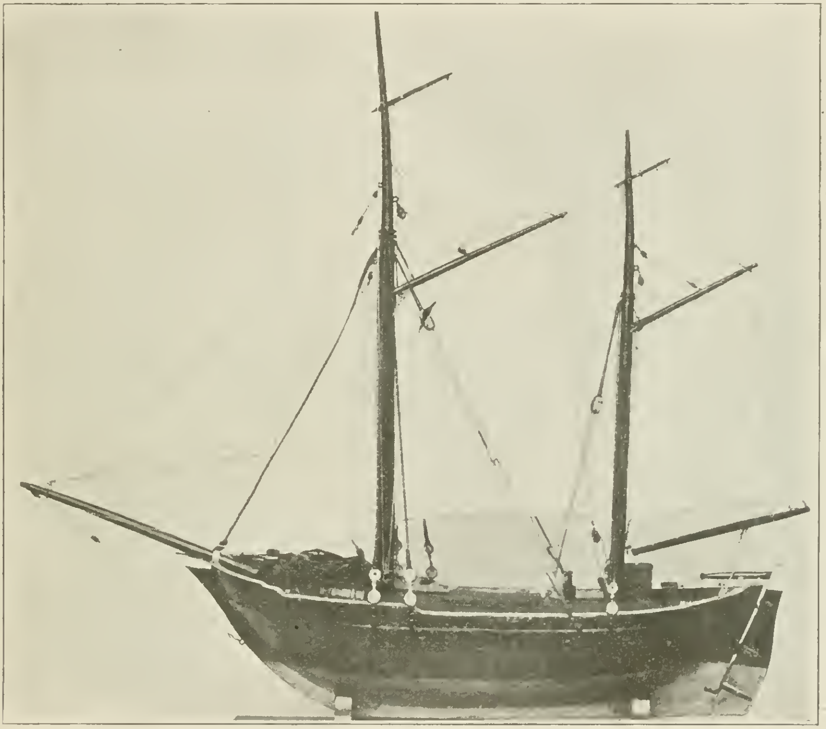


FIG. 76.—NORWEGIAN "BANKSKIOTE."

Model of Norwegian fish freighter.

This type of vessel is used for transporting fish from the Loffoden Islands and other codfishing stations to the principal markets, among which Bergen occupies a prominent position. The cod, either as "stockfish" or "klipfish" are dried very hard and are piled high on the vessel, sometimes to half the height of the mast. These vessels range from 44 to 55 tons, averaging about 66 feet in length. According to tradition, this style of vessel has remained almost unchanged for many centuries, and it is believed that the Norsemen came to America in a similar craft 1,000 years ago.

The model represents a wooden, carvel-built, keel vessel, with full, convex bow; very high stem; moderate rise to floor; round bilge; short run; heavy, square stern; rudder hung outside; boat at stern davits; steers with tiller; cabin aft; forecastle; old style windlass; movable deck that can be raised to the middle of the mast to cover dry codfish that are piled high. Single mast little forward of amidships, tapered at top to form topmast; large, square mainsail with four bonnets; square topsail and jib; jib-stay sets up to stem, topmasts stay to stem head.

Dimensions of vessel.—Length over all, 60 feet; beam, extreme, 21 feet; depth, 7 feet; bulwarks, 27 inches high; length of movable deck, 32 feet 3 inches; mast, deck to hounds, 46 feet 6 inches; above hounds, 16 feet 6 inches; main yard, 37 feet 6 inches; topsail yard, 27 feet. Boat (square stern, clinker-built, six thwarts) length, 17 feet 7 inches; beam, 4 feet 1½ inches; depth, 18 inches. Scale of model, two-thirds inch equals 1 foot.

Gift of Owie & Stone. Cat. No. 55,785 U.S.N.M.

Model of Norwegian fishing boat.

This is one of the types of boats most extensively employed in the cod fisheries of the Loffoden Islands, Norway, which are situated north of the Arctic Circle, and where the industry is carried on chiefly from January to April.

This is an open, clinker-built (five strakes on a side) keel boat; long, sharp ends, with concave water lines; hollow floor; flaring sides; curved and high stem and sternpost; rudder hung outside; long tiller; steering chock from side to side aft; strong sheer; vertical washboards or false gunwales amidships for one-third boat's length; five thwarts; three bulkheads beneath thwarts; six one-pronged rowlocks with leather thongs attached for holding oars in place; six oars; two five-pronged grapnels; one boat hook. Single mast stepped a little forward of amidships, supported by four shrouds on a side and stay to stem head. On this is set a single square-headed lugsail with two reefs at top and one reef at bottom.

Dimensions of boat.—Length over all, 38 feet 7½ inches; beam, 10 feet 8 inches; depth amidships (exclusive of washboards), 2 feet 7½ inches; height of washboards, 9 inches; depth of keel, 9 inches; mast, 27 feet 9 inches; main yard, 14 feet. Sail: Head, 13 feet 6 inches; foot, 20 feet 3 inches; luff and leach, each 18 feet 7 inches. Scale of model, 1⅓ inches equal 1 foot.

Boats of this type vary in size from 35 to upward of 40 feet in length. They row easily and sail well, but, with a load of fish, they set very low in the water. They are frequently caught in storms that arise suddenly. They set so low in the water amidships that it is often impossible to prevent the waves from breaking into a boat. When a boat is in danger of filling, the fishermen all jump together on one side and by a simultaneous movement turn it completely over, scramble onto the bottom, stick their knives into the keel, and cling to the knife handles until help arrives or they perish. The Loffoden fishermen prefer a boat that can be thus capsized, and so strong is this prejudice that, whatever other good qualities a craft might have, if it lacks in this particular the Norwegians of that region will not use it.

Gift of Berlin Fishery Exposition. Cat. No. 55,786 U.S.N.M.

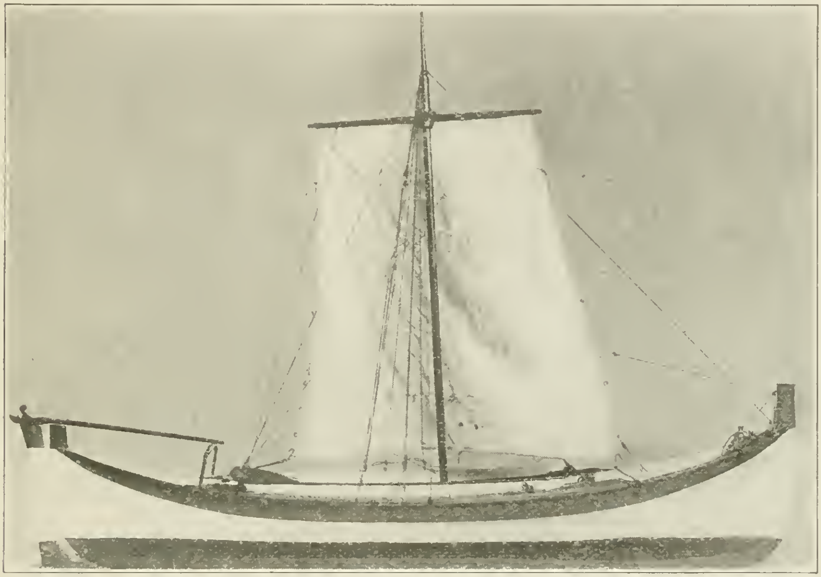


FIG. 77.—NORWEGIAN FISHING BOAT.

Model of Lister (Norway) fishing boat.

Boats of this type are used chiefly in the mackerel and herring gill net fisheries from the town of Lister, on the west coast of Norway. They range from 35 to 40 feet in length, and have the reputation of being swift sailers.

This is a wooden, clinker-built (nine planks on a side), sharp-ended, keel boat; hollow rising floor; water lines very concave; raking curved stem and sternpost; rudder outside; steers with tiller; open; washboards, with coamings, along the sides; four thwarts (second one from bow with mast hole); six frames; diagonal frame or breasthook at bow and stern; sloop rigged; mast little forward of amidships; loose-footed sprit mainsail, with brail lines and three reefs; forestaysail and jib.

Dimensions of boat.—Length over all, 22 feet 6 inches; keel, 17 feet; beam, 8 feet 6 inches; depth, 2 feet 6 inches; mast, above thwarts, 17 feet 3 inches; bowsprit, outboard, 5 feet 6 inches; oars, 15 feet long. Scale of model, 1 inch equals 1 foot.

Gift of Norwegian Commission. Cat. No. 55,791 U.S.N.M.

Model of Norwegian fishing boat.

Boats of this type are used in the fisheries at Sondmore, Norway. It is believed by the fishermen of that place that this peculiar construction renders the boats more elastic, safer, and swifter in a seaway. It is claimed that they are very swift and will sail exceedingly close to the wind. They range from 39 to 43 feet in length.

This is an open, clinker-built, keel boat; ends sharp, overhanging, and strongly flaring; deep keel, curving up like a sled runner at each end to form stem and sternpost, which are high; bottom slightly concave, with much dead rise, being nearly straight on top of upper strake; small rudder; peculiar jointed tiller; adjustable roller on port bow for hauling nets over; single mast, stepped amidships, with strong rake; four shrouds a side, with toggles on lower ends that pass through beckets at the boat's side; single lugsail, with narrow head, tacks down to stem; eight oars.

The construction is peculiar. There are four strakes on a side except at bow, where there are six strakes; lower bow planks are put on diagonally, with ends chamfered to fit on other planks, to which they are nailed; no gunwales, strengthening pieces along the inside next to upper strake; heavy timbers; six thwarts; four rowlocks on starboard, five on port side.

Dimensions of boat.—Length over all, 41 feet 2½ inches; on keel, 20 feet 5 inches; beam, 12 feet; depth, inside amidships, 3 feet 2½ inches; length of rudder, 8 feet; length of tiller, 12 feet 5 inches; rudder arm, 3 feet 7 inches; mast, 26 feet 9½ inches; net roller, 6 feet 9 inches; sail: head, 6 feet 9 inches; foot, 22 feet 5 inches; luff, 27 feet 7 inches; leach, 21 feet. Scale of model, 1¼ inches equal 1 foot.

Cat. No. 55,788 U.S.N.M.

Model of Norwegian six-oared fishing boat.

This type of fishing boat is used at Bergen and vicinity, on the west coast of Norway. It is called a "six-oared boat" because three pairs of oars are generally used for its propulsion.

It is a wooden, clinker-built, open, double-ended, keel boat, with sharp bow and stern, the former being slightly full; raking, curved stem and sternpost; rising floor; flaring side; rather strong sheer; four thwarts; three single-horned wooden rowlocks on each side.

Dimensions of boat.—Length, 19 feet; beam, 5 feet; depth, 20 inches. Scale of model, thirteen-sixteenths inch equals 1 foot.

Cat. No. 55,787 U.S.N.M.

Model of Swedish fishing vessel.

Vessels of the class represented by this model, to which the generic name of "bankskuta" has been applied, fish chiefly for ling on the Storregen Bank. They make one voyage yearly, starting in April and returning in September. They hail from the island of Tjorn, on the Bohuslan coast. The peculiar flaring bow is thought to be necessary, by Swedish fishermen, to enable the vessel to ride safely at anchor.

The model represents a wooden, carvel-built, keel vessel; notably wide and deep; flush deck, strong sheer; full, flaring scoop-shaped bow; great rake to stem; hollow water lines and floor; stern shaped like bow, full above, concaved below; straight sternpost; narrow, square-heeled rudder; moderate depth of keel; heavy bow chocks; windlass works with handspikes; cabin forward; four hatches; one pump; one large anchor; cable runs over roller in stem; steers with tiller; low, heavy bulwarks. Ketch rigged, with running bowsprit; six sails—jib, forestaysail, mainsail, sprit mizzen, and two square-headed gaff topsails.

Dimensions of vessel.—Length over all, 63 feet; on keel, 42 feet; beam, 26 feet 8 inches; depth of hold, approximately, 9 feet; keel, 18 inches deep; deadwood, above keel, 2 feet 5¼ inches high; bulwarks, amidships, 16 inches high; at bow and stern, 3 feet 9 inches high; bowsprit, outboard, 21 feet 9 inches; mainmast, deck to hounds, 46 feet 6 inches, from hounds to truck, 24 feet 4½ inches; mizzenmast, deck to hounds, 43 feet 6 inches; hounds to truck, 12 feet 9 inches; sprit of spanker, 33 feet; outrigger, outboard, 15 feet 9 inches. Scale of model, two-thirds inch equals 1 foot.

These vessels are strongly built of oak for frame and outside plank; deck of pine. The Tjorn fishing craft are usually carvel built and divided into four classes: First, the largest vessels (represented by the model), from 60 to 70 tons, with 14 men; second, those of 40 to 50 tons, with 10 men; third, boats of 30 tons, with 8 men; and fourth, small craft of 12 to 15 tons, with crews of 5 or 6 men. In 1862 the Swedish fishermen learned of an abundance of ling on Storregen Bank, or "Great Ledge," 130 miles distant. They needed large vessels for the fishery there, and about 1865 to 1870 a number were built averaging about 70 tons each.

Exchange from Swedish Centennial Commission.

Cat. No. 76,008 U.S.N.M.

Model of Swedish fishing boat.

Boats of this type are used in the mackerel fisheries of southern Sweden, especially on the Bohuslan coast.

The model represents a wooden, clinker-built, decked, keel boat, with moderately sharp ends, concave below water line; curved and strongly raking stem and sternpost; hollow floor, straight on top: cabin amidships: yawl rig; five sails—jib, forestaysail, mainsail, gaff-topsail, and jigger sail.

Dimensions of boat.—Length over all, 36 feet; on keel, 23 feet; beam, 13 feet 6 inches; bowsprit, outboard, 14 feet; mainmast, above deck, 31 feet; main sprit, 31 feet 6 inches; gaff-topsail pole, 39 feet 6 inches; mizzenmast, above deck, 22 feet 6 inches; sprit, 18 feet; outrigger, outboard, 5 feet. Sale of model, one-half inch equals 1 foot.

Gift of Swedish Centennial Commission. Cat. No. 28,154 U.S.N.M.

Model of Gottland (Sweden) fishing boat.

Boats of this class are used in the herring fisheries from the island of Gottland, in the Baltic Sea, off the east coast of Sweden. In 1869 the number of boats so employed from that island was officially given at 606, manned by 1,911 persons. The Gottland boats have an excellent reputation for seaworthiness: it is said they are ofen caught out in heavy gales. The largest of these craft are 25 feet long.

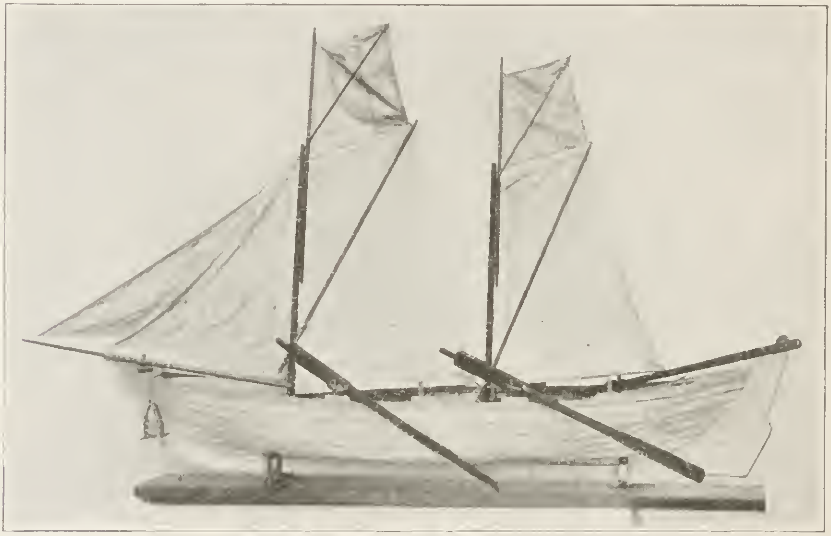


FIG. 78.—SWEDISH HERRING BOAT.

An open, clinker-built, sharp-ended, keel boat, with curved stem and sternpost; round bilge, 7 strakes on a side; 15 frames; 5 thwarts—2 with mast holes—schooner rigged, carrying 2 small loose-footed spritsails, 2 square-headed sprit topsails, and 2 jibs. Provided with stone killick in wooden frame; peculiar, wide-loomed oars, with cleats to ship over single, round wooden tholes.

Dimensions of boat.—Length over all, 21 feet 10 inches; beam, 5 feet 8 inches; depth inside, 2 feet 2 inches; bowsprit, 9 feet 6 inches; foremast, 10 feet 1 inch; foresprit, 9 feet 6 inches; fore-topsail pole, 8 feet 4 inches (4 feet 6 inches below masthead); topsail sprit, 5 feet; mainmast, 9 feet 3 inches; mainsprit, 9 feet; main topsail pole, 7 feet 5 inches (4 feet below masthead); topsail sprit, 4 feet 2 inches. Scale of model, 3 inches equal 1 foot.

Gift of Swedish Centennial Commission. Cat. No. 28,149 U.S.N.M.

Model of Swedish fishing boat.

This type of boat has the specific name of "brakeka." It is used in the herring fisheries from Blekinge. The single sail ("raasagel") has in recent years been superseded to a large extent by a spritsail rig, and some boats are rigged as yawls, carrying two spritsails, two jibs, and two sprit-topsails.

An open, clinker-built (eight strakes on a side) keel boat, with sharp convex bow; curved, strongly raking stem; round bilge; flaring side; well-formed run; thin and narrow square stern; good sheer; single mast stepped amidships; large square-headed lugsail (with four reefs); larger part of sail forward of mast.

Dimensions of boat.—Length over all, 19 feet; on keel, 13 feet; beam, 6 feet 3 inches; depth, 27 inches; width of stern, 2 feet 1½ inches; mast, 16 feet 3 inches; yard, 12 feet 9 inches; oars, 8 feet; sail: luff, 12 feet; leach, 14 feet; head, 12 feet; foot, 10 feet 6 inches. Scale of model, 2 inches equal 1 foot.

Gift of Swedish Centennial Commission. Cat. No. 28,148 U.S.N.M.

Model of Swedish fishing boat.

Boats of this class are employed in the herring fisheries of Skane, in the extreme south of Sweden. They carry crews of three or four men, sometimes as many as six or seven, and 60 to 70 herring gill nets. They average 17 to 18 feet in length.

An open, clinker-built (eight strakes on a side), sharp-ended keel boat, with slightly hollow floor and raking stem and sternpost, yawl-rigged, five sails—jib, forestay sail, sprit main, and mizzen sails, square-headed gaff-topsail, four broad-handled oars.

Dimensions of boat.—Length over all, 18 feet 9 inches; beam, 7 feet 6 inches; depth, 2 feet 10 inches; bowsprit, outboard, 4 feet 4 inches; mainmast, 14 feet 3 inches; main topmast, 13 feet 6 inches (6 feet 6 inches above masthead); main sprit, 13 feet 6 inches; gaff-topsail yard, 3 feet; jigger mast, 7 feet 1 inch; oars, 12 feet 4½ inches. Scale of model, 1⅓ inches equal 1 foot.

Gift of Swedish Centennial Commission. Cat. No. 28,152 U.S.N.M.

Model of Swedish herring boat.

Boats of this class are used in the herring fisheries from the coast of Pitea, Gulf of Bothnia. The model represents an open, clinker-built (three strakes on a side), sharp-ended keel boat, with curved stem and sternpost, rising floor, two thwarts, two mast thwarts from gunwale to gunwale, two spritsails, two oars.

Dimensions of boat.—Length over all, 17 feet; on keel, 12 feet; beam, 5 feet 4½ inches; depth inside, 20½ inches; depth of keel, 6 inches; foremast, above thwart, 9 feet; mainmast, above thwart, 9 feet 10½ inches. Scale of model, 2 inches equal 1 foot.

Gift of Swedish Centennial Commission.

Cat. No. 28,147 U.S.N.M.

Model of Swedish fishing skiff.

This type of boat is known as the "Eka," and is used for fishing in the smaller lakes of Sweden. The model represents an open, clinker-built, flat-bottom boat, with four battens; flaring sides; narrow square bow and stern, the latter widest; good shear; bottom curved up at ends. Covered seat amidships with trapdoor in it and covered lockers, with doors at each end; three oars; 1 wooden scoop bailer.

Dimensions of boat.—Length over all, 15 feet 4 inches; width, extreme, 5 feet 4 inches; bow at top 16 inches wide; height amidships, 15 inches; oars, 8 feet. Scale of model, 1½ inches equal 1 foot.

Gift of Swedish Centennial Commission.

Cat. No. 28,146 U.S.N.M.

Model of Grecian fishing boat.

Boats of this class vary in size from 25 to 50 feet in length, the larger ones being decked. They fish with nets and lines from the Island of Sciathos; carry crews of seven to eight men; frequently go 50 miles from home and stay out 10 to 15 days.

The model represents an open, carvel-built, keel boat with sharp bow; straight stem and sternpost; short floor with medium rise; round bilge; rather full run; square V-shaped stern; fair sheer; metal crutches on rail for holding oars, etc.; one gaff; two dip nets; two oars; sloop-rigged, sprit and boom mainsail and jib; painted black outside with white bead and white inside with black trimmings.

Dimensions of boat.—Length over all, 29 feet 4½ inches; on keel, 28 feet 6 inches; beam, 11 feet; width of stern, 6 feet 9 inches; depth, 5 feet 1½ inches; mast, above thwart, 23 feet 3 inches; extreme length, 26 feet 6 inches; sprit, 25 feet 6 inches; boom, 22 feet 6 inches; gaff, 20 feet (including metal portion, 2 feet 9 inches long); oars, 16 feet 9 inches; common dip net, 14 feet long; dip net of peculiar form, 22 feet long. Scale of model, 1 inch equals 1 foot.

At the bow the boat is decked for a short distance to form a "cuddy" for the crew to sleep in. At the extreme bow the deck is level with the gunwales, and in this is a circular hole where the anchor and cable are stowed.

Exchange from Greek Centennial Commission.

Cat. No. 76,009 U.S.N.M.

Model of Grecian fishing boat.

This type of boat is used all along the coast of Greece and in the Grecian Archipelago for net fishing. Boats of this type vary from 35 to 41 feet in length. They do not usually go far from land. With their many oarsmen (propelled by 16 oars) and projecting beaks, they suggest the old-time galley for which Greece was once famous.

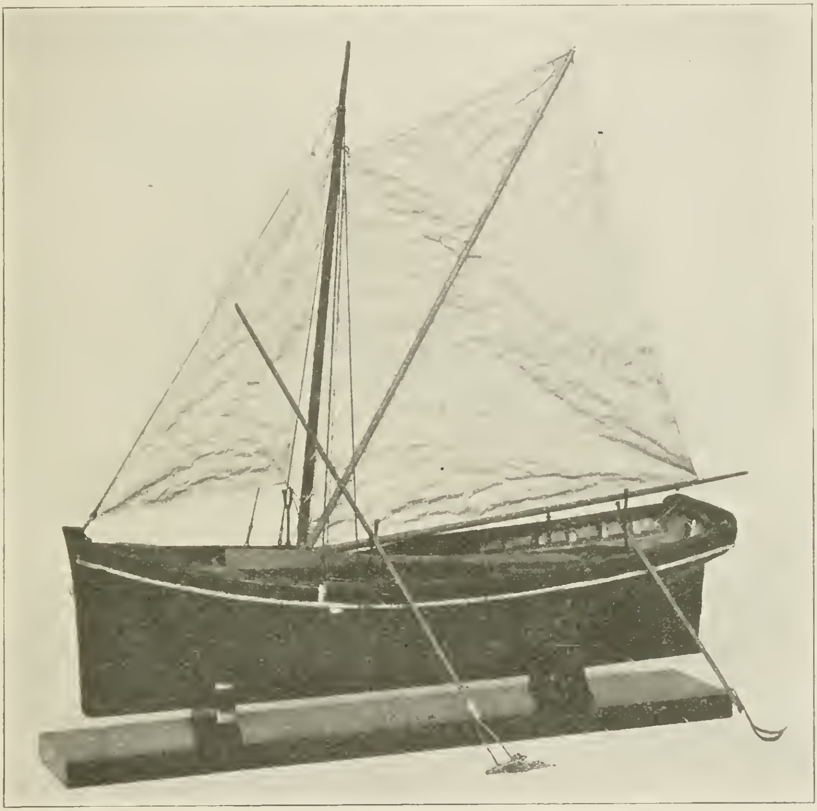


FIG. 79.—GRECIAN FISHING VESSEL.

The model represents a wooden, carvel-built, double-ended, keel boat, with long finely-formed bow, slightly concaved below water line; curved stem, which projects outwardly near the top like the cutwater of an American fishing schooner, though not so far; low, rather flat floor; round bilge; stern sharp and shaped like the bow; sternpost curved near its lower end, with little rake; rudder hung to two pintles; short carved tiller; decked, with exception of long open space in middle for rowers to sit; raised bulwarks and rail; mast forward for drying nets.

Dimensions of boat.—Length over all, 36 feet; on keel, 32 feet; beam, 9 feet 6 inches; depth, 3 feet 3 inches; height of rail, 1 foot; mast, above deck, 16 feet 3 inches; full length, 19 feet 3 inches; oars, 12 feet 7½ inches. Scale of model, 1 inch equals 1 foot.

Exchange from Greek Centennial Commission.

Cat. No. 76,004 U.S.N.M.

Model of Turkish caique.

A type of boat used for pleasure and for the ordinary purposes of passenger transportation on the Golden Horn, Constantinople, Turkey. It is a wooden, carvel-built, open, keel rowboat; long, sharp-pointed, overhanging ends; sharp floor; flaring sides; graceful sheer; ornamental adjustable deck forward, with two elevated gilded upright pieces at bow; three thwarts for oarsmen, who row each with a pair of peculiar oars having bulb-shaped handles, and blades hollowed out at ends like a mackerel's tail; cushioned and upholstered seats aft for passengers, with fluted and gilded backboard.

Dimensions of caique.—Length, 33 feet 6 inches; beam, 2 feet 10 inches; depth, 14 inches; oars, 7 feet long. Scale of model, 1 inch equals 1 foot.

Gift of John Murdock. Cat. No. 76,163 U.S.N.M.

PART 4.

DESCRIPTION OF VESSELS AND BOATS OF ASIA AND AFRICA.

Model of Singhalese dugout canoe.

A type of dugout called "ballam" by the natives of Ceylon, and quite extensively used for fishing and other purposes. The model represents an open, round bottom, keelless, double-ended dugout, with convexly sharp ends, nearly vertical above and curved below; sides round and tumbling in at top; straight on top; short solid section at each end (a short distance below gunwales) to answer for seats; thwart amidships flush with gunwales; and with hole in center to receive mast.

Dimensions of canoe.—Length, 26 feet 9 inches; width, on top, 2 feet 7 inches; depth, inside, 2 feet 6 inches. Scale of model, 2 inches equal 1 foot.

Collected by Dr. G. Brown Goode. Cat. No. 76,312 U.S.N.M.

Model of Singhalese cargo boat.

A type of boat used for purposes of transportation in Ceylon. It is an open square-ended, flat-bottomed scow; lower part of sides formed of half of a long, narrow log dugout, pointed at ends; side planks sewed to log and to ends; all seams joined by sewing; sides tumble in somewhat.

Dimensions of boat.—Length, 31 feet 6 inches; beam, 5 feet 9 inches; depth, 2 feet 7 inches. Scale of model, 2 inches equal 1 foot.

Collected by Dr. G. Brown Goode. Cat. No. 76,308 U.S.N.M.

Model of Singhalese catamaran.

A type of boat used on canals in Ceylon for transportation of freight, etc. Sometimes it is called "padda boat" by the natives. It is a square-ended, flat-bottomed, scow-shaped boat, with strongly raking ends; lower part of sides (or what might be termed the garboards) formed of vertical longitudinal section of pointed long dugout, like those used for outrigged canoes; above are thin, vertical planks, with flat gunwales; graceful sheer; boat entirely open, but covered with arched roof of matting resting on bamboo or rattan frames, and coming within about 1 foot, more or less, of the gunwales; fitted with paddles and pear-shaped blades, flat on one side and somewhat rounded on the other, lashed to lower end of handles.

Dimensions of boat.—Length, 28 feet 7½ inches; width at top, 6 feet 4½ inches; depth, 2 feet 7½ inches; length of roof, 18 feet 6 inches; paddles, 8 feet 9 inches. Scale of model, 2 inches equal 1 foot.

Collected by Dr. G. Brown Goode. Cat. No. 76,305 U.S.N.M.

Model of Singhalese cargo boat.

A type of boat used in Ceylon for the transportation of rice from one point to another, and also for carrying and laying out drag seines used for catching fish on the shores of that island. It is an open, flat-bottomed, scow-shaped boat, with short, flat bottom; long sloping square ends; sides formed of half a dugout pointed log, with superstructure of vertical planks sewed to the logs; all seams joined in the same manner; strong sheer, four wooden rowlocks lashed to bow, each having a becket of coir rope to hold the oar; oars with long, slim round handles, and short, nearly oblong blades, shaped something like the ordinary square-ended shovel tied on.

Dimensions of boat.—Length, 32 feet 2 inches; beam, 5 feet 1½ inches; depth, 3 feet 3 inches; oars, 13 feet long; blades, 15 inches long by 6½ inches mean width. Scale of model, 2 inches equal 1 foot.

The use of the log dugout in Ceylon for the construction of various kinds of boats is most remarkable.

Collected by Dr. G. Brown Goode. Cat. No. 76,306 U.S.N.M.

Model of a Singhalese platform ferryboat.

The dugouts used at Kundsale, Ceylon, as ferryboats for transferring passengers, etc., are very similar to those constituting the lower section of the outrigged sailing canoes of Ceylon, the chief difference being that they are flat on their bottoms instead of being round—a feature which makes them better adapted to landing on shallow shores.

This model consists of two long, narrow, round-sided, flat-bottomed, open dugout canoes, with strongly raking overhanging ends, placed equidistant from each other, and covered with a platform for more than half their length in mid section, leaving the open ends of dugouts projecting some distance beyond the platform.

Dimensions of boat.—Length of canoes, 28 feet; greatest width, inside, 14 inches: projecting beyond platform, 7 feet at one end and 5 feet 8 inches at the other: length of platform 15 feet 4 inches, width 8 feet 5 inches. Scale of model, 2 inches equal 1 foot.

Collected by Dr. G. Brown Goode. Cat. No. 76,307 U.S.N.M.

Model of Singhalese catamaran.

Catamarans are used in Ceylon for various purposes, but especially for boarding ships in open roadsteads, where the surf is too heavy for ordinary boats to affect a landing. These catamarans are usually 20 to 30 feet long, but those of much smaller size are used for fishing, and some are very diminutive.

The model represents a vessel made of five hewn logs of mahogany, securely fastened together by strong lashings at each end, and so disposed that the side logs are canted to raise their upper edges considerably above the others and thus forming a sort of hollow longitudinally through the center. The three central logs project at the stern some distance abaft those on the sides, and afford a position, on their lee side, for the steering oar. The bow is formed by three short hewn pieces of timber, rounded at the outer ends, firmly joined together, and so secured to the forward end of the raft that they project upward at a considerable angle. A single triangular sail, dyed red (probably with gab), and with a yard on its foot is set on a mast stepped amidships; poles and oars are also used.

Dimensions of catamaran.—Length, 25 feet 5 inches; width, 3 feet 7 inches; mast, above step, 13 feet; yard, 14 feet 5 inches; pole, 17 feet 3 inches. Scale of model, 2½ inches equal 1 foot.

A catamaran—spelled katamaran or kattumaran in Ceylon—was exhibited at the Columbian World's Fair, which had been used for years to carry the Ceylon and Indian mails between the shore and streams lying off the open roadsteads. The mails, incased in waterproof coverings, are thus safely carried, while passengers often find it necessary to make a trip on one of these rude boats.

Collected by Dr. G. Brown Goode. Cat. No. 76,304 U.S.N.M.

Model of Malay outrigger canoe.

According to Folkard, this type of boat has probably been used for several thousand years. He supposes Pliny to refer to them. Anson, in his voyages, speaks of their speed in extravagant terms, declaring that they sail 30 miles an hour. Observations taken by British officers showed them to have a speed of 20 miles an hour. Admiral Wilkes, of the United States Navy, speaks of the speed of similar boats as inconceivable. They are used by the Malays in the Straits of Malacca and are of the same type of outrigger canoe as that used by the natives of Ceylon. They are among the swiftest boats known.

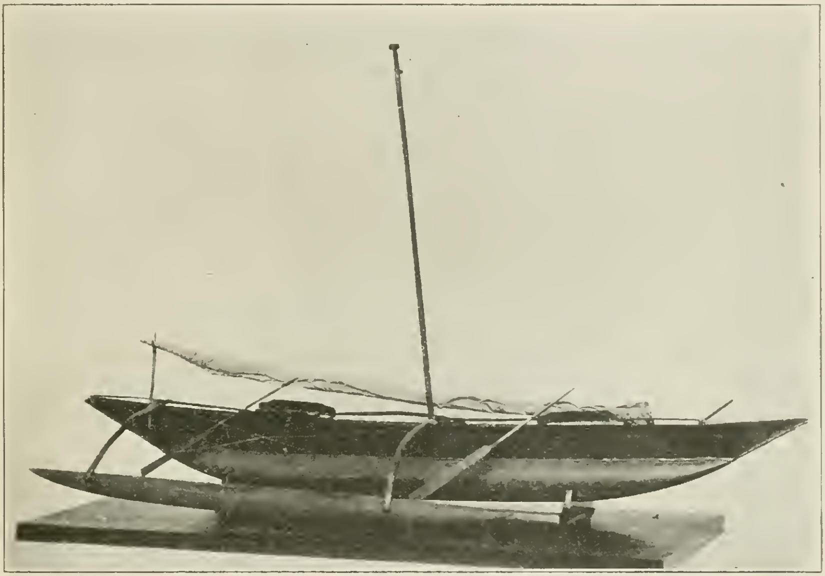


FIG. 80.—MALAY OUTRIGGER CANOE.

The model represents a long and narrow double-ended canoe, the bottom formed of a pointed dugout log upon which is a superstructure of vertical planks sewed to the log by coir twine and rising some distance above it, having strongly raking square ends. The canoe is provided with two outriggers at the ends of which is a balance log which prevents the boat from upsetting. The rig consists of a single mast, upon which is set a large square-headed lugsail.

Dimensions of canoe.—Length over all, 25 feet 3 inches; inside width at top, 9 inches; depth, 2 feet 4 inches; length of balance log, 16 feet 6 inches; outriggers, outboard, 7 feet; mast above gunwale (to cap) 12 feet 7½ inches; yard, 17 feet 3¾ inches; paddles, 6 feet 3 inches. Scale of model, 2 inches equals 1 foot.

Gift of P. L. Jouy. Cat. No. 76.164 U.S.N.M.

Model of Malay pirate boat.

A type of "prahu" used by the pirates of the Eastern Archipelago for attacking unarmed merchant vessels. It was armed with two cannons and four swivels of light caliber.

The model represents a wooden, keel craft, of very peculiar form; moderately sharp, excessively hollow bow; raking curved stem: long curiously carved head; long, sharp, concave floor, which forms an acute angle with top; long, easy run; slightly raking straight sternpost; narrow, square-heeled rudder; heave and high square stern; medium sheer except at stern, where the deck curves up strongly; high poop, under which is cabin, magazines, etc.; loose bamhoo deck forward of poop; fitted to row 28 oars; equipped with two cannons mounted on wooden carriages and pointing forward through wooden bulwarks extending athwart the bow forward of foremast; swivel on each side of foremast, mounted on stanchion and pointing over the plank poop, one on each side; two tall, slim bamboo masts, fitted to lower; two square sails of bamboo; a small bowsprit extends beyond the head, but no sail is set on it.

Dimensions of prahu.—Length over all (end of long head to taffrail), 66 feet 6 inches; between perpendiculars, 50 feet; beam, 11 feet; depth, 3 feet 8 inches; foremast, above deck, 45 feet 6 inches; fore flagpole (lashed to top of foremast), 16 feet; foresail, 26 feet high by 15 feet 6 inches mean width; mainmast, above deck, 47 feet; flagpole, 16 feet (10 feet above masthead); mainsail, 28 feet high by 17 feet mean width; diameter of masts, 5 inches. Scale of model, 1 inch equals 1 foot.

The island of Sooloo appears to have been the chief center of pirates in the first half of the nineteenth century. In the report of Wilkes's exploring expedition (vol. 5, pp. 376–377) the following reference is made to the pirates and their vessels: "The following are the piratical establishments of Sooloo * * *. The first * * * is the port of Soung * * * in the island of Sooloo, not so much from the number of men available here for this pursuit, as the facility of disposing of the goods * * *. There are other rendezvous on Pulo Toolyan, at Bohol, Tonho, Pilas, Tawi Tawi, Sumlout, Pantutaran, Parodasan, Palawan, and Basillan, and Tautoli on Celebes. These are the most noted, but there are many minor places where half a dozen *prahus* are fitted out. Those of Sooloo, and those who go under the name of the Lanuns (name derived from bay on south side of Mindanao Island), have *prahus* of larger size and better fitted. They are from twenty to thirty tons burden, and are propelled by both sails and oars. They draw but little water, are fast sailers, and well adapted for navigating through these dangerous seas. These pirates are supposed to possess in the whole about two hundred *prahus*, which are usually manned with from forty to fifty pirates; the number therefore engaged in this business may be estimated at ten thousand. They are armed with muskets, blunderbusses, krises, hatchets, and spears, and at times the vessels have one or two large guns mounted. They infest the Straits of Macassar, the Sea of Celebes, and the Sooloo Sea * * *.

"Besides the pirates of Sooloo, the commerce of the Eastern Islands is vexed with other piratical establishments. In the neighboring seas there are Malay pirates * * *. Their *prahus* are of much smaller size than those of Sooloo, being from ten to twelve tons burden, but in proportion they are much better manned, and thus are enabled to ply with more efficiency their oars or paddles. These *prahus* frequent the shores of the Straits of Malacca, Cape Romania, the Carimon Isles, and the neighboring straits, and at times they visit the Straits of Rhio. Some of the most noted * * * were fitted out from Johore; * * * they generally have their haunts on the small islands of the coast, from which they make short cruises. * * *

"These small *prahus* have usually swivels mounted, which, although not of great caliber, are capable of throwing a shot beyond the range of small arms. It is said they seldom attempt an attack unless the sea is calm, which enables them to approach their victims with more assurance of success, on account of the facility with which they are enabled to manage their boats. The frequent calms which occur in those seas between the land and sea breezes afford them many opportunities of putting their villainous plans into operation. They are generally found in small flotillas of from six to twenty *prahus*, and when they have succeeded in disabling a vessel at long shot the sound of the gong is the signal for boarding, which if successful results in a massacre more or less bloody, according to the obstinacy of the resistance they have met with."

Collected by W. Henry. Cat. No. 3,892 U.S.N.M.

Model of Malay pirate vessel.

A type of vessel of the East Indian Archipelago, commonly called "flying proa," used by Malay pirates to attack merchant vessels when becalmed.

The model represents a wooden, carvel-built, keel vessel, with sharp, hollow bow; raking, curved stem; long, curiously shaped head; sharp floor; quick turn to bilge; easy run; raking, straight sternpost; narrow, square-heeled rudder; high, square stern (the hull of the boat is sharp aft, but above this is a flat superstructure extending abaft the hull and laterally on each side); strong sheer; high poop aft, under which is the cabin, magazine, etc.; adjustable main deck of bamboo laths attached together by coir twine; open rail forward of poop for oars to work through; sheer strakes extend forward of bow some distance; two square sails set on slim bamboo masts, which step in stanchions extending above deck; the masts are fitted to lower suddenly; armed with four swivels, two mounted on beam extending from rail to rail just forward of the foremast and two on beam extending across the poop; rows with 24 oars.

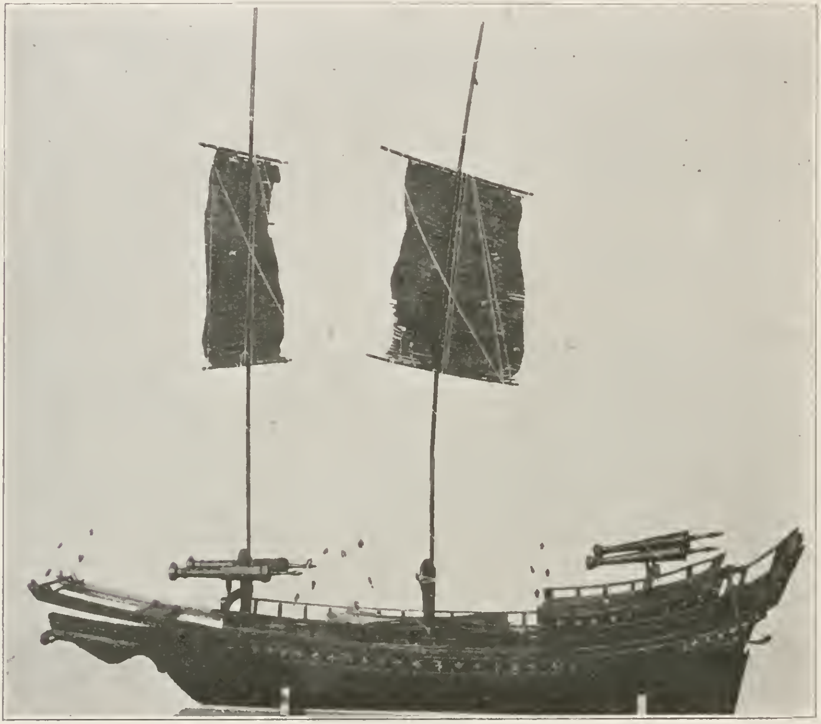


FIG. 81.—MALAY PIRATE VESSEL.

Dimensions of vessel.—Length over all (including forward extension or platform), 51 feet 4 inches; between perpendiculars (or hull proper), 38 feet 4 inches; beam, 8 feet 8 inches; depth, 3 feet 4 inches; foremast, above deck, 41 feet; foresail, 14 feet 4 inches high by 13 feet 4 inches wide; mainmast, above deck, 41 feet 4 inches; mainsail, 13 feet 8 inches high by 16 feet 4 inches wide. Scale of model, three-fourths inch equals 1 foot.

A vessel of these dimensions would be between 11 and 12 tons burden—the size most commonly used by the Malays. The model is painted in imitation of a prahu; bottom, black to bends; top striped with yellow, red, and dark green, with a sort of fleur-de-lis in white on the green.

This model has no flagpole, such as is common to larger prahus; the pennants are hoisted by halyards passing through a hole at the mastheads.

Collected by W. Henry. Cat. No. 3.895 U.S.N.M.

Model of Dayak prahu.

"Dayak is the name given to all the wild tribes of Sumatra and Celebes, but is particularly applied to those of Borneo, where they are most numerous."—Encyclopedia of India, page 30. The lug-rigged prahu used by the Dayaks is called "bajak" by them.

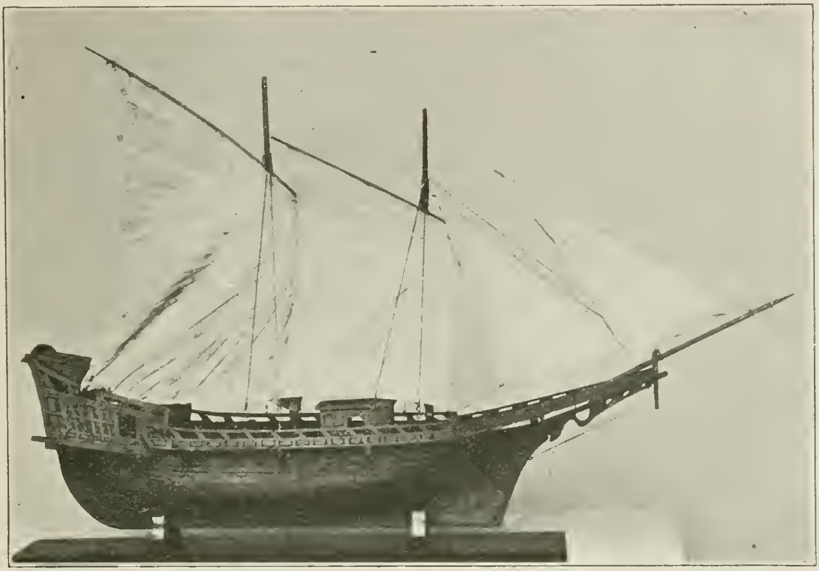


FIG. 82.—DAYAK LUG-RIGGED PRAHU CALLED "BAJAK."

This model has a sharp, hollow bow; moderately raking; curved stem, projecting forward at top and having attached a long, curiously carved head; sharp floor; quick turn to bilge; moderately sharp hollow aftersection below superstructure, with strongly curved sternpost; large square stern; flat below. The stern is the afterend of a superstructure which rests upon the after part of the hull, and is supported at the sides by two strong beams which are laid across the vessel and extend some distance beyond the sides—far enough for a plank footway to rest upon each side of the quarter. The vessel is decked with a large deck house between the mainmast and foremast, and a hatchway abaft the mainmast. On each side are projecting open galleries for oarsmen. Forward is a long pointed platform extending far beyond the bow, to the extremity of the long head, and having a sort of vertical cap at its end to receive the bowsprit, the point of the head, etc. The vessel carries three cotton lug sails, fore staysail, and jib.

Dimensions of prahu.—Length over all (to extremity of fore platform), 57 feet 9 inches, of hull proper, 45 feet; beam, 12 feet; width, to outside of galleries, 15 feet; depth, 4 feet 10½ inches; bowsprit, outboard, 12 feet; foremast, above deck, 34 feet 6 inches; main yard, 28 feet 3½ inches; mizzenmast, above quarter-deck, 21 feet; mizzen yard, 15 feet. Scale of model, three-fourths inch equals 1 foot.

Collected by Dr. G. Brown Goode. Cat. No. 76,232 U.S.N.M.

Model of Siak "lanchang."

This type of vessel is used at Siak, on the coast of Sumatra, and strongly resembles the piratical prahus of the East Indian Archipelago. It has a very hollow sharp bow; stem straight and nearly vertical; projecting carved head; hollow floor curving down to keel; quick bilge; sharp hollow run; nearly vertical, slightly concave sternpost; heavy, elaborately carved, overhanging square stern, the bottom of which is only a flat platform; projecting flat counters; high quarter-deck or poop, beneath which is the cabin, the latter with open spaces at sides; open rail around quarter and main deck; projections forward on each side, with openwork platform between and carved head of bird; two slim bamboo masts stepped in stanchions open on after side.

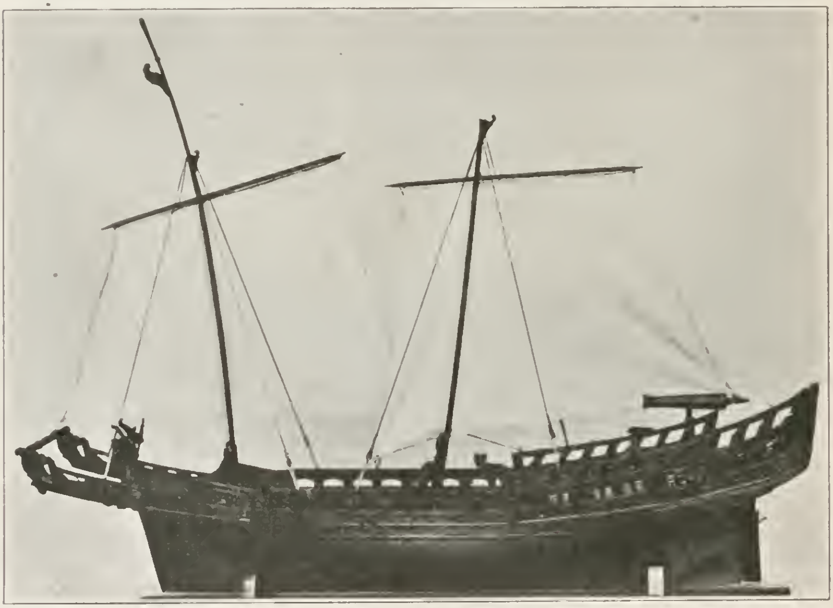


FIG. 83.—SUMATRA "LANCHANG."

Dimensions of vessel.—Length over all, 42 feet 6 inches; between perpendiculars, 32 feet; beam, 6 feet 6 inches; depth, 3 feet; foremast, above deck, 26 feet 9 inches; main mast, above deck, 29 feet. Scale of model, 1 inch equals 1 foot.

Collected by Dr. G. Brown Goode. Cat. No. 76,206 U.S.N.M.

Model of Johore pirate vessel.

A peculiar type of vessel called "lanon," in the native dialect, used by the pirates of Johore and vicinity to attack passing merchant vessels. It has a strong affinity to the Malay prahus, and, like them, is propelled by sails and oars.

This model represents a wooden, carvel-built, keel, junk-like craft, with sharp and excessively hollow bow; recurved stem, having a carved fiddle head at its top; projecting, open platform at bow; hollow, moderately high floor; quick turn to bilge; run shaped like bow, also with carved fiddle head at top of sharp section; very heavy carved square stern, which is flat below on sides; strong sheer, especially in after section; galleries extending from each side to accommodate an upper bank of oars; large house on main deck, with latticed openings on sides; high quarter-deck or poop with a peculiar kind of skylight on it, while beneath is the cabin; large steering oar on each side aft, the handle passing upward through the quarter-deck and its top fitted with a sort of tiller; masts fitted with a form of swivel socket at the foot and supported by wooden sheers toggled near the masthead and with the feet resting abaft and on each side of the mast. The object of this device is to provide for the instant lowering of the masts when boarding a vessel or when concealment is necessary. It carries two square cotton sails, the after one being very small.

Dimensions of vessel.—Length over all (including extension forward), 49 feet 4 inches; of hull proper, 42 feet 8 inches; depth of hold, 3 feet 8 inches; mainmast, above house, 27 feet 8 inches; upper yard, 27 feet; lower yard, 28 feet 8 inches; jiggermast, above deck, 13 feet 8 inches. Scale of model, three-fourths inch equals 1 foot.

Collected by Dr. G. Brown Goode. Cat. No. 76,207 U.S.N.M.

Model of Johore rajah's boat.

A type of boat used at Johore, India, and called "bidar" in the native dialect. The model has a long, sharp, hollow bow; stem curved strongly forward at top and having a carved fiddle head at its extremity; sharp floor extending to water line; hollow run; straight sternpost; narrow square-heeled rudder; flat, overhanging square stern, decked; roofed in after section; cotton lugsail set on mast, stepped well forward.

Dimensions of boat.—Length over all (including head), 34 feet; beam, 6 feet 6 inches; depth, 3 feet; mast, above deck, 17 feet 7 inches; yard, 10 feet 10 inches; oars of varying lengths, average, 10 feet. Scale of model, 1 inch equals 1 foot.

Collected by Dr. G. Brown Goode. Cat. No. 76,214 U.S.N.M.

Model of Johore rajah's boat.

The type of boat used by the Rajah of Johore for pleasure or the ordinary purposes of water transportation.

The boat has a sharp bow with moderately concave lines below; forward end of keel curved (or "rockered") upward; stem raking, carved on sides, surmounted by carved neck and head of a peacock; sharp floor hollowed out below to form a sort of keel; sharp aft; straight raking sternpost; rudder square at heel; boat mostly open; fitted to row four oars on a side; superstructure in after section extending over the stern and mostly covered with bamboo-thatched roof; has small cotton lugsail forward.

Dimensions of boat.—Length over all, 28 feet; length of hull, 24 feet 9 inches; beam, 6 feet 7½ inches; depth, 3 feet 4 inches; length of thatched roof, 8 feet 3 inches; mast above gunwale, 13 feet; yard, 10 feet; sail, 10 feet 6 inches high by 9 feet wide. Scale of model, 1 inch equals 1 foot.

Collected by Dr. G. Brown Goode. Cat. No. 76,205 U.S.N.M.

Model of Johore vessel.

A yacht-like vessel used at Johore, India. It is a wooden, carvel-built, keel vessel with long, sharp, hollow bow; concavely curved stem surmounted by a projecting carved head of a dragon and forming nearly a right angle with the keel; sharp, hollow floor; quick turn to bilge; moderately long, well-formed run; straight, nearly vertical, sternpost; square-heeled rudder; round stern; bulwark carved outside and open on sides; short raised deck aft and at the bow; two swivel guns of light caliber, mounted, one on each side, on a large beam extending from rail to rail forward of the foremasts. Rigged with two short masts and two small cotton sails which are apparently of the settee order, but much like balance lugsails.

Dimensions of vessel.—Length of hull over all, 46 feet 8 inches; beam, 11 feet; depth, 4 feet 8 inches; foremast, above deck, 20 feet; foreyard, 22 feet; mainmast, above deck, 22 feet 8 inches; main yard, 28 feet 8 inches. Scale of model, three-fourths inch equals 1 foot. Cat. No. 76,302 U.S.N.M.

Model of Johore "penchalang."

A type of boat employed at Johore, India, for transportation purposes. It has a sharp, hollow bow; moderately raking curved stem; rather full midship section; sharp stern, with rather curved sternpost; steers with an oar; straight on top; short curved spaces fore and aft; carved and open washboards, or bulwarks, along open portion of boat; four thwarts; single mast stepped in forward thwart; single lugsail with yard on foot.

Dimensions of boat.—Length, 31 feet 6 inches; beam, 7 feet 6 inches; depth, inside, 3 feet 3 inches; mast, above gunwale, 16 feet 9 inches; upper yard, 16 feet; lower yard, 15 feet; sail, 12 by 13 feet; steering oar, 13 feet 3 inches; oar, 13 feet. Scale of model, 1 inch equals 1 foot.

Collected by Dr. G. Brown Goode. Cat. No. 76,231 U.S.N.M.

Model of Johore "sampan panjang."

A type of boat employed at Johore, India, and vicinity for transportation purposes. Ordinarily it is propelled with paddle-shaped oars, but with a leading or fair wind a small cotton lugsail is used to increase the speed.

The model represents a dugout, keel canoe, sharp at both ends; long, sharp, hollow bow; curved cutwater, raking strongly and projecting forward in a sort of snout, with carved head of dragon; sharp floor; long and very lean run; nearly vertical, slightly concave sternpost; rudder worked by rude yoke—a treenail transversely through the head, with lines attached; moderate sheer; entirely open framework, from forward of amidships aft, to hold light cargo; three oars on a side, hung by fiber beckets to a long round rowlock, the ends of which rest in cleats, and which is supported by three upright posts or tholes; a single mast stepped near the bow; on this is set a small lugsail.

Dimensions of vessel.—Length over all, 37 feet; beam, 6 feet 7½ inches; depth, inside, 2 feet 9 inches; mast, above gunwale, 12 feet, 6 inches; yard, 10 feet 1½ inches; sail, mean height, 10 feet; mean width, 8 feet 6 inches; oars of varying lengths, mostly 10 feet long; steering oar, 10 feet 9 inches. Scale of model, 1 inch equals 1 foot.

Collected by Dr. G. Brown Goode. Cat. No. 76,217 U.S.N.M.

Model of Johore "fast boat."

This type of lug-rigged dugout, locally called "banting" or "atcheen" boat, but generally designated as "fast boat" by Europeans, is commonly used at Johore, Straits Settlements, India. It is one of the most remarkable forms of dugout canoe in the world, and its fine sailing qualities have earned for it the cognomen of "fast boat."

The model represents a dugout canoe with long, sharp, hollow bow; stem joined to bow, raking, curved, and projecting strongly forward at top; hollow, sharp floor, shaped so as to form a keel;

sharp stern; long, lean run, with wave-shaped lines; sternpost joined to stern; sheer moderate but most pronounced at bow; boat open, with inside gunwales or ribbands fitted with holes for thole pins; has five strong frames and two cross bulkheads, one at each end; four thwarts; has two masts and bowsprit; carries two loose-footed balance lug (or settee) sails and small jib.

Dimensions of boat.—Length over all, 33 feet 4 inches; beam, 5 feet 10 inches; depth, 2 feet 11 inches; bowsprit, outboard, 10 inches; foremast, above gunwale, 10 feet 10 inches; yard of forelug, 16 feet 6¾ inches; mainmast, above gunwale, 12 feet 8½ inches; main yard, 20 feet 10 inches. Scale of model, 1⅕ inches equal 1 foot.

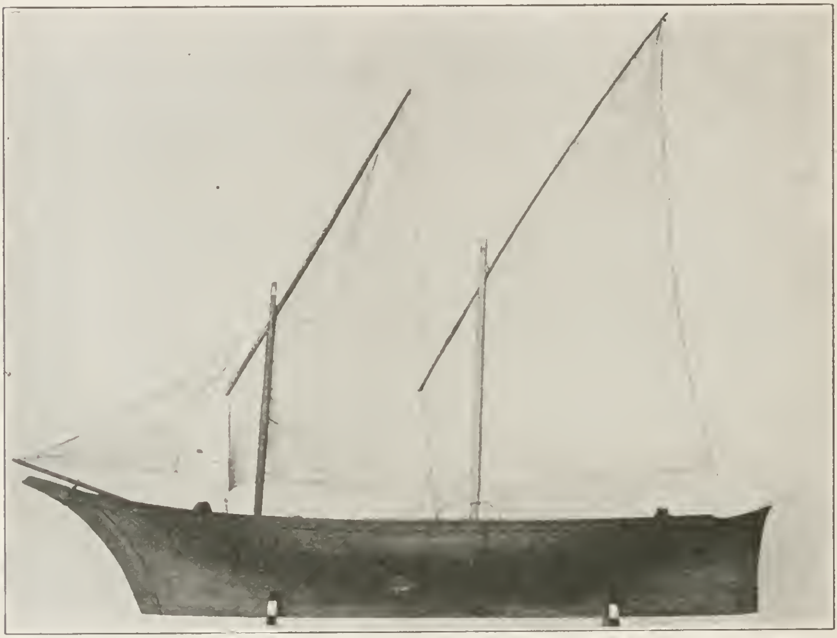


FIG. 84.—JOHORE "FAST BOAT."

These boats are perhaps among the most remarkable examples of the wave-line form in the world; their midship section closely resembles that of modern yachts. It is little less than marvelous that the semicivilized builders of these craft should have arrived so near perfection in designing by "rule of thumb" methods.

Collected by Dr. G. Brown Goode. Cat. No. 76,230 U.S. N.M.

Model of Johore "sampan."

The natives use this type of canoe at Johore and vicinity for the ordinary purposes of transportation. It is a sharp-ended, keelless dugout, propelled only by oars or paddles; with moderately raking curved ends; sharp floor; quick turn to bilge; straight on top; platform at each end; decked with split bamboo for nearly half the boat's length, forward of after platform, and covered with an adjustable roof of bamboo leaves, which are sewed together and fastened to a pole on each side, the after end of which rests in a crutch that assists in supporting a framework of poles that projects over the stern and is peculiar to certain types of oriental boats.

Dimensions of boat.—Length of hull, over all, 23 feet 6 inches; beam, 6 feet; depth, inside, 2 feet 4½ inches; length of bamboo deck, 10 feet; length of framework, 17 feet 6 inches; average length of oars and paddles, 10 feet. Scale of model, 1 inch equals 1 foot.

Collected by Dr. G. Brown Goode. Cat. No. 76,229 U.S.N.M.

Model of Malay boat.

This type of boat is used along the coast of Malacca. It is a sharp-ended, keel boat, with long, sharp, hollow bow, projecting strongly forward at top and carved at extremity; hollow rising floor; quick turn to bilge; very long, sharp stern, exceedingly lean below, raking slightly and concavely curved at end (or sternpost); narrow rudder hung on pintles (rudder has peculiar oblong open mortise on after side), and with wooden yoke passing transversely through the head; slight sheer; decked with wood; light elevated frame extending from near the bow to the extreme stern and supported on stanchions (forked or otherwise) fastened to the sides of the boat, and on a bar extending across a large wooden support at the stern; after section roofed over with bamboo leaves sewed together; beneath this roof the height of sides is increased by vertical washboards permanently fixed; elevated round rail, of the ordinary Malay form, fastened to stanchions, or top-timbers, forward of roof section, and with loops of coir to hold the oars; has one mast stepped well forward, and a single small loose-footed lugsail, and a jib tacking down to stem head; oars with lanceolate blades and slim round handles.

Dimensions of boat.—Length over all, 32 feet 4 inches; beam, 5 feet; depth, 2 feet 6 inches; length of roof, 11 feet; mast above deck, 10 feet 8 inches; yard, 8 feet; mainsail, 9 feet 8 inches mean height, by 7 feet 4 inches, mean width; foot, 5 feet 4 inches; oars, 8 feet. Scale of model, 1½ inches equal 1 foot.

Collected by Dr. G. Brown Goode. Cat. No. 154,161 U.S.N.M.

Model of Johore fishing boat.

This is a model of a boat called "jalor penjala" in the native dialect and used for fishing with a small net.

The model is of an open, double-ended, keelless canoe-shaped dugout; with long, sharp raking ends and slightly concave water lines; bottom curved up considerably at each end; sharp floor; easy turn to bilge; moderate sheer; platform over bottom in central section;

bulkheads about one-quarter of boat's length from each end; platforms in ends higher than that in the middle.

Dimensions of boat.—Length, 20 feet; beam, 4 feet; depth, 2 feet. Scale of model, 1½ inches equal 1 foot.

Collected by Dr. G. Brown Goode. Cat. No. 76,210 U.S.N.M.

Model of Johore boat.

This type of boat used at Johore, India, and vicinity, is called "prau nadi" in the native dialect.

The model represents an open, square-ended, keelless dugout, with raking V-shaped ends: considerable rise to floor; sharp turn to bilge; straight on top; covered with deck of split bamboo, attached by coir twine; elevated pole gunwales; paddles with dagger-shaped blades and cross handles.

Dimensions of boat.—Length, 20 feet; beam, 4 feet; depth, 2 feet. inches; depth, inside. 21 inches; paddles, 5 feet 3 inches. Scale of model, 1 inch equals 1 foot.

Collected by Dr. G. Brown Goode. Cat. No. 76,233 U.S.N.M.

Model of Malay dugout canoe.

A type of dugout canoe used in the hook and line fishery along the coast of the Malay Peninsula.

The model represents a double-ended keel dugout, with long, sharp hollow ends, rising concaved floor; raking, recurved stem and sternpost, each rising some distance above the gunwale; rather straight on top; decked, over fish rooms; two thwarts, one for steersman at stern and one for mast step near the bow; small spritsail of cotton; rudely carved head of sea bird at bow.

Dimensions of boat.—Length, between stem and sternpost, 30 feet; beam, 6 feet; depth, 2 feet 6 inches; mast above thwart, 10 feet 11 inches. Scale of model, 1 inch equals 1 foot.

Collected by Dr. G. Brown Goode. Cat. No. 76,221 U.S.N.M.

Model of Johore "sampan panjang."

A type of boat used at Johore, India, and vicinity. The model shows a partially decked keel boat, with long, sharp hollow bow, projecting at top; stem concavely curved; hollow rising floor; long lean sharp stern; rudder outside, hung with metal pintles; good sheer.

Dimensions of boat.—Length over all, 23 feet 8 inches; beam, 4 feet 5 inches; depth. 22 inches. Scale of model, 1½ inches equal 1 foot. Cat. No. 76,218 U.S.N.M.

Model of Boyan canoe.

This type of dugout canoe is called "kolik" in the native dialect. It is a long, narrow, open dugout, with long sharp ends, projecting at bottom and top and carved above; round, keelless bottom, strongly cambered at ends; good sheer, most pronounced at bow and stern; one large thwart on top of gunwale, through which mast steps; carries a small cotton square sail, with yard on bottom.

Dimensions of canoe.—Length over all, 21 feet 6 inches; beam, 3 feet 4 inches; depth, inside, 19 inches; mast, above thwart, 10 feet; sail, 6 feet 10 inches high by 7 feet 9 inches wide. Scale of model, 1 inch equals 1 foot.

Collected by Dr. G. Brown Goode. Cat. No. 76,223 U.S.N.M.

Model of Rajah's boat.

A type of small vessel used by the Rajah of Bukit Batu, and designated as "ketam batu" by the natives. It has a very hollow sharp bow; straight, moderately raking stem, forming nearly a right angle with keel; long carved head; rising hollow floor; quick bilge; sharp hollow run; straight sternpost; square-heeled narrow rudder; large, overhanging, elaborately carved square stern, which is open below; high quarter-deck with large skylight on top; open bulwarks to quarter and main deck; projections forward as usual on Malay boats; armed with swivels, etc.; two square-headed lugsails of leaves sewed together, set on tall slim masts that are stepped in stanchions rising above deck and open on after side to admit of instant lowering of spars; foremast rakes forward and mainmast aft.

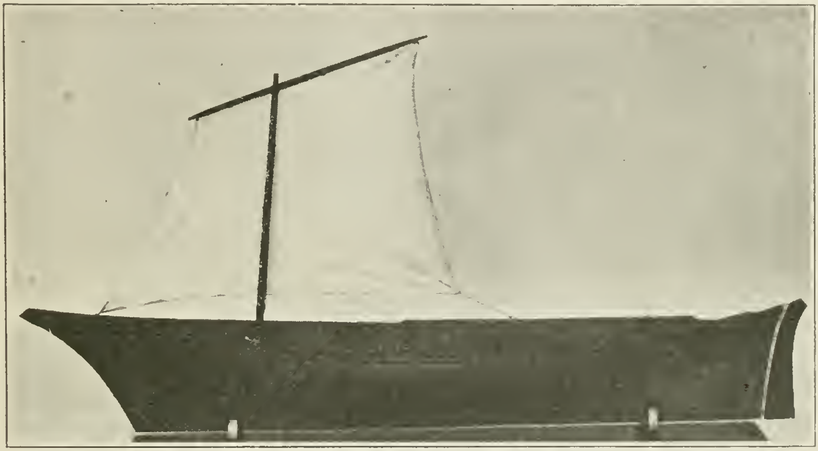


FIG. 85.—"SAMPAN PANJANG," JOHORE, INDIA.

Dimensions of boat.—Length over all, 46 feet 4 inches; between perpendiculars, 33 feet 4 inches; beam, 10 feet; depth, 3 feet 6 inches; foremast, above deck, 37 feet 8 inches; forelug, 14 feet 8 inches high by 18 feet wide; mainmast, above deck, 34 feet 8 inches; main lug, 18 feet high by 18 feet 6 inches wide. Scale of model, three-fourths inch equals 1 foot.

Collected by Dr. G. Brown Goode. Cat. No. 76,215 U.S.N.M.

Model of Rajah's boat.

A type of boat, called by the natives "katayap," used by the Rajah of Perak, India. The hull proper is a keelless, double-ended dugout, with rising floor; quick bilge; rocker bottom; long, sharp, overhanging ends, which are cut off square at the extremities, leaving very narrow and shallow square ends. Above this dugout is a superstructure which extends posteriorly some distance, forming a sort of square stern, with open platform abaft the main hull and with apertures to receive steering oars. On each side of the quarter is a high bulwark, forming the sides of the cabin, which is covered with matting laid on the framework. An open bulwark, fitted to receive oars, extends from the cabin on each side to a raised bulkhead near the bow; projecting forward from these is a piece of timber, or plank, terminating in a carved fiddle head; these are supported by a beam crossing the extreme bow, upon which rests the carved head of a crocodile. The boat is decked.

Dimensions of boat.—Length over all, 37 feet; of hull proper, 29 feet 6 inches; beam, 6 feet 6 inches; depth, 2 feet 6 inches; steering oar, 8 feet. Scale of model, 1 inch equals 1 foot.

Collected by Dr. G. Brown Goode. Cat. No. 76,209 U.S.N.M.

Model of Malacca catamaran.

A crude, primitive raft made of logs, called "rakit" by the natives, is used in the shallow waters or rivers of the Malay Peninsula.

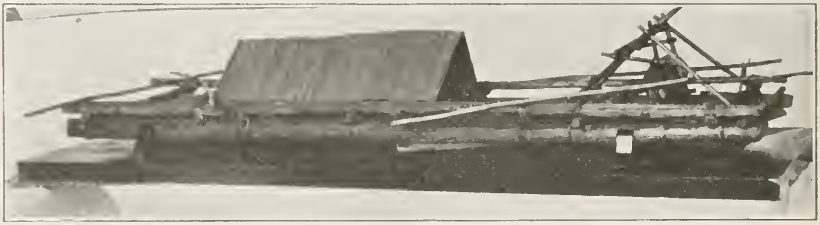


FIG. 86.—MALACCA CATAMARAN.

It is a raft of 11 small logs of unequal sizes, bound together with ropes of bark or wood fiber passing over round crossbars laid on top of the catamaran at varying distances apart and extending beyond each side; main logs, except those at the sides, pointed at their forward ends, which reach only about three-quarters of the raft's length and are supplemented by short sections of logs extending to the bow of the catamaran, and also pointed on their forward ends; two small, rough poles on each side lashed above the ends of crossties forming a sort of rude gunwale to steady freight, etc.; partially covered with roof made of bamboo leaves sewed together. The model is provided with a collection of small timber laid horizontally to illustrate the method of stowing timber on one of these rafts.

Dimensions of catamaran.—Length, 41 feet 9 inches; width, 12 feet 3 inches. Scale of model, 1 inch equals 1 foot.

Collected by Dr. G. Brown Goode. Cat. No. 76.227 U.S.N.M.

Model of Rhio dugout canoe.

This type of boat is used in the hook and line fishery by the natives of Rhio, India, who give it the name of "kolik." It is a sharp-ended, keel dugout; with sharp hollow bow and stern; raking curved stem and sternpost to near the top, where they are turned abruptly back and surmounted by a curiously formed high knee-shaped timber, projecting outward at top; hollow floor; quick turn to bilge; straight on top; fish rooms with temporary deck; carries a single square-headed lugsail, with yard on foot; lanceolate-bladed paddles.

Dimensions of boat.—Length, 23 feet 6 inches; beam, 6 feet 3 inches; depth, 3 feet; mast, above gunwale, 14 feet 6 inches; upper yard, 13 feet 6 inches; lower yard, 14 feet 6 inches; sail, 12 feet high by 11 feet 9 inches wide; paddles, 9 feet 9 inches; steering oar, 16 feet. Scale of model, 1 inch equals 1 foot.

Collected by Dr. G. Brown Goode. Cat. No. 76.288 U.S.N.M.

Model of Bugis "pediwak."

A decked, keel craft of curious form and rig, such as is used by the Bugis in northern Celebes. It is wide and deep; has a hollow sharp bow, much lower than the main body of the boat, which is square above on its forward end, some distance aft; stem curved and raking; rising floor; quick turn to bilge; short well-formed run, with curved raking sternpost (the hull of the boat is really sharp aft, with a superstructure above it); very large, nearly vertical square stern, profusely carved; sides carved also; stern flat below, projecting on sides and resting on two cross timbers which extend at some distance, with planks laid horizontally upon them and secured; broad open galleries along the sides; decked, with one large hatch in main deck; high quarter-deck or poop, beneath which is the cabin; mast formed of three spars joined together by a bolt or treenail at the head; the feet separated and each stepped in a wooden socket and held by a bolt in such a manner that the mast can be lowered instantly. There is a Jacob's ladder made by rungs passing through the two after spars at proper distances apart. The bowsprit steps in the forward bulkhead and rests on a wooden block at the extreme bow; it is supported laterally by a spar on each side which steps in the bulkhead, the other end being lashed to the bowsprit a short distance outboard. A wide lugsail (with yard on bottom) and jib are carried. The boat is steered with large wide-bladed oars.

Dimensions of boat.—Length over all, 32 feet; beam, 9 feet 4 inches; depth, 4 feet 4 inches; mast, above deck, 16 feet 10 inches;

upper yard, 23 feet 8 inches; lower yard, 25 feet 8 inches; lugsail, 11 feet mean height by 21 feet mean width; bowsprit, outboard, 6 feet 8 inches; jib (set flying); luff, 20 feet; foot, 10 feet; leach, 16 feet; oars, 20 feet 8 inches. Scale of model three-fourths inch equals 1 foot.

The Bugis of northern Celebes are celebrated as being one of the bravest and most enterprising of the maritime races of the East.

Collected by Dr. G. Brown Goode. Cat. No. 76,212 U.S.N.M.

Model of Java boat.

This type of Java and Pulau Klapa boat is called "champlong" by the natives. It is a double-ended keel boat with sharp, hollow bow and stern; curved stem and sternpost, rising considerably above gunwale, curved strongly inboard, and terminating in a nearly oval-shaped, elaborately carved end; has a rising, hollow floor; quick bilge; fair sheer; is decked, the deck being on a level with the thwarts except at the extreme bow, where it is flush with the gunwale; has high quarter rails or washboards abaft the middle, which form the sides for a mat roof to rest upon; forward of these is an open supplementary rail with single tholes and oars held by twine beckets; carries a single cotton lugsail.

Dimensions of boat.—Length, 25 feet; beam, 8 feet; depth, 3 feet 4 inches; mast, above deck, 12 feet 8 inches; upper yard, 18 feet 4 inches; lower yard, 31 feet; oars, 9 feet 10 inches. Scale of model, three-fourths inch equals 1 foot.

Collected by Dr. G. Brown Goode. Cat. No. 76,211 U.S.N.M.

Model of Bombay fishing boat.

This peculiar type of boat is employed for fishing purposes and locally known as the "machva" or "muchva," terms which in the native dialect mean a fisher or fishers. The machva is one of the most distinctive types of fishing boats in the world. It has the reputation of being very swift under sail, but owing to the form of its keel can not tack to windward, but is compelled to wear when it is necessary to go about. While it has no deck, the boat is strengthened by many thwarts, and is generally provided with a sort of matting of palm-wood laths fastened with a cord, which can be let down on the thwart as a temporary deck or rolled up out of the way like patent shutters. These boats are built of teak and must necessarily be made very strong, since when beached they touch bottom only at the bow and stern. Generally, however, everything entering into their construction and rig is of the rudest. The timber and even the spars are said to be often coarse and crooked, "yet they sail like witches and last longer than their owners." They are not generally iron fastened, but it is not long since the fastenings were very largely of coir twine, which is even yet used a good deal for the purpose, especially in the upper works. The machva has little gear besides her simple rigging. A grapnel of six arms, weighing from 60 to 100 pounds, a dozen long paddles and as many bamboo poles about 15 feet long, a small, heavy box filled with sand to serve as a caboose, two leathern buckets, and a lantern form the whole of her inventory, and with these on board a boat of 12 tons has probably cost from four to five hundred rupees to rig and fit.

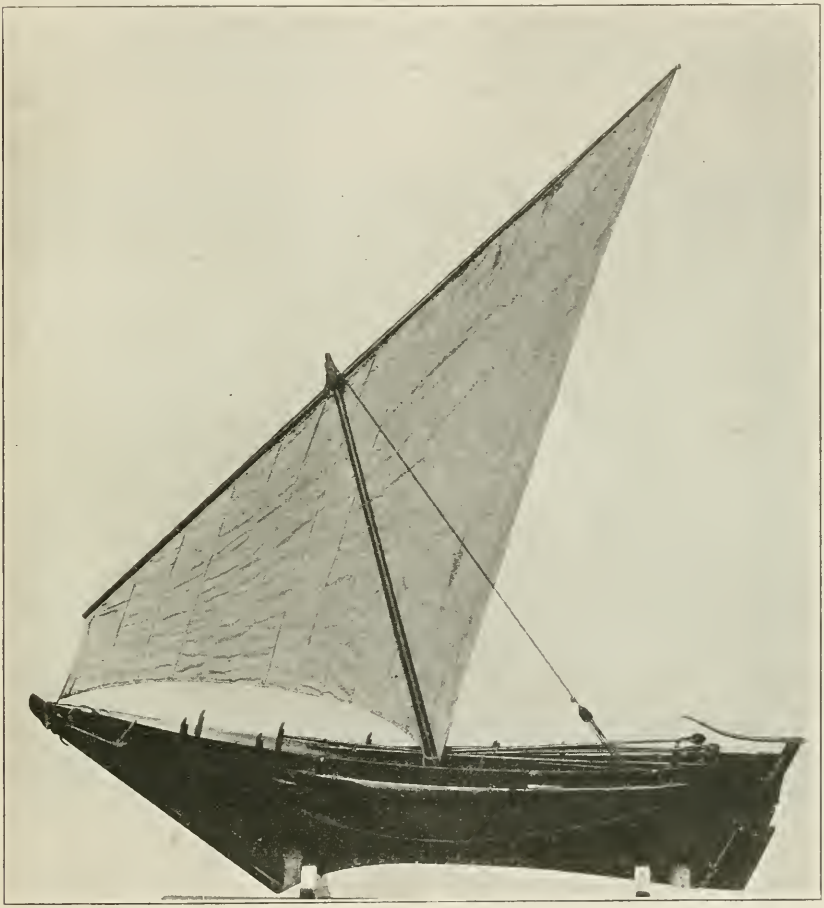


FIG. 87.—BOMBAY "MACHVA."

The model shows a wooden, carvel-built, open, keel boat; with long, sharp, overhanging bow; strongly raking, straight stem, projecting some distance above the gunwale and extending below to form a deep finlike angular projection with the hollow keel; rising floor; round easy bilge; hollow, well-formed run; moderately raking, straight sternpost; full, rounding stern, without overhang; rudder hung outside; keel curved upward in center and projecting below at each end to form deep skags or fins; large settee sail set on most stepped nearly amidships, and raking strongly forward; model built of Malabar teak, which is a wood commonly used for construction of boats of this kind; equipped with oars, etc.

Dimensions of boat.—Length over all (including sternpost and projecting stem), 41 feet 9 inches; beam, 9 feet 7½ inches; depth, inside, 5 feet; mast, above gunwale, 22 feet 6 inches; rake, 4½ inches to foot; yard, 44 feet; leach, 39 feet 6 inches; foot, 21 feet 9 inches; oars, 18 feet 9 inches. Scale of model, 1 inch equals 1 foot.

Gift of Surg. Gen. Francis Day. Cat. No. 160,149 U.S.N.M.

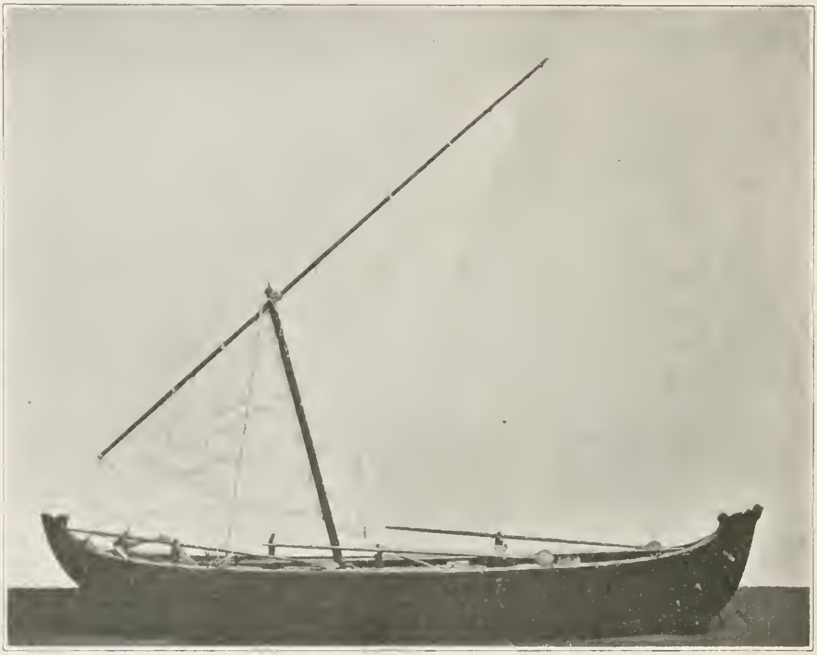


FIG. 88.—BOMBAY FISHING CANOE.

Model of Bombay fishing canoe.

A form of a curious dugout canoe called a "tony," used for fishing purposes at Bombay, East Indies.

The model is made of Malabar teak wood and represents a long, narrow, double-ended dugout canoe, with convexly sharp ends; strongly raking, convexly curved bow and stern; bottom round and keelless except at ends, where a short rockered keel is worked on; rudder attached to stem by rope beckets; very little sheer except at ends, which rise abruptly in sharp curve, forming a sort of high stem and sternpost, each of which is carved at top; open, fitted with four thwarts, oars, etc.; carries a single settee sail on mast raking forward, the clew of the sail trimming forward of amidships; oars with long slim handles and pear-shaped blades lashed on.

Dimensions of canoe.—Length over all, 30 feet; beam, 4 feet 6 inches; depth, 2 feet 6 inches; after keel, 5 feet 6 inches long by 9 inches greatest depth; forward keel, same dimensions; mast, above thwart, 12 feet; yard, 25 feet 6 inches long; oars, 12 feet 3½ inches long. Scale of model, 1 inch equals 1 foot.

Gift of East Indian Centennial Commission.

Cat. No. 160,151 U.S.N.M.

Model of Laccadive Islands fishing boat.

The type of boat used by the fishermen of the Laccadive Islands for fishing in the lagoons. It is a wooden, carvel-built, open, double-ended boat; nearly V-shaped in cross section; with sharp ends; strongly raking stem and sternpost, the former projecting some distance above the bow; plank sewed together with coir twine; three thwarts; platform at each end; mast stepped considerably abaft amidships and raking strongly forward; carries large settee sail with yard on bottom.

Dimensions of boat.—Length over all, 19 feet; on keel, 13 feet; beam, 4 feet; depth inside, 16 inches; mast, above thwart, 13 feet 3 inches; upper yard, 14 feet; lower yard, 17 feet. Scale of model, 1 inch equals 1 foot.

Gift of Surg. Gen. Francis Day. Cat. No. 160,156 U.S.N.M.

Model of Laccadive Islands fishing boat.

A type of boat used for sea fishing at the Laccadive and Maldive Islands. It is a wooden, carvel-built, open keel boat; sharp at both ends; with hollow water lines; sharp rise to floor and flaring sides; stem straight, raking strongly and projecting some distance above bow; raking curved sternpost; good sheer; rudder hung with small coir rope; planks sewn together with coir twine, which holds a roll of loose coir firmly to inside of seams and thus prevents leakage. Three thwarts, and a seat at the bow and stern; carries a large settee sail set on mast stepped amidships and raking slightly forward.

Dimensions of boat.—Length over all, 19 feet 9 inches; keel, 13 feet 6 inches; beam, 5 feet 2 inches; depth, inside, 2 feet; mast, above thwart, 11 feet 6 inches; yard, 21 feet 3 inches. Scale of model, 1 inch equals 1 foot.

Gift of Surg. Gen. Francis Day. Cat. No. 160,157 U.S.N.M.

Model of Laccadive Islands fishing canoe.

Dugout canoes of this type are employed in the fisheries at the Laccadive Islands, off the coast of Hindoostan. They are crude in construction, but have the reputation of being good sailers.

The model represents a rough, open, keel dugout, with round bilge and long slanting convex ends; strongly raking stem, projecting above and beyond the hull and having a flat circular knob at its top; straight part of keel short; after part rises at an acute angle; stern of canoe shallow; has one mast stepped nearly amidships and raking strongly forward; a single large settee sail.

Dimensions of canoe.—Length, over all, 16 feet 3 inches; of hull, 13 feet 6 inches; beam, 3 feet 6 inches; depth, inside, 18 inches; mast, above thwart, 10 feet 6 inches; yard, 19 feet; oar, 9 feet 9 inches. Scale of model, 1 inch equals 1 foot.

Gift of Surg. Gen. Francis Day. Cat. No. 160,152 U.S.N.M.

Model of Laccadive Islands fishing canoe.

Dugout canoes of this form are used at the Laccadive Islands, mostly in the lagoons. The model represents a crude, canoe-shaped, double-ended, keelless dugout with round bottom curving up at ends; bow and stern sharp and overhanging; straight on top; it has two thwarts and a single mast stepped a little abaft amidships and raking strongly forward; it has a large settee sail; is steered with an oar.

Dimensions of canoe.—Length over all, 15 feet 6 inches; beam, 2 feet 4½ inches; outside depth, 2 feet; mast, above gunwale, 9 feet 3 inches; yard, 11 feet. Scale of model, 1 inch equals 1 foot.

Gift of Surg. Gen. Francis Day. Cat. No. 160,153 U.S.N.M.

Model of Madras boat.

Boats of this type are used at Madras, India, for conveying passengers and freight through the surf to and from ships lying in the roads. Their extremely light and elastic construction combines strength with excessive buoyancy, while the form enables them to ride safely over high seas and to carry a large cargo on a comparatively light draft.

The boat is wide and has a deep, flat bottom; built of thin planks of strong and elastic hardwood sewn together with a sort of diamond stitch on the inside passing over strips of coir, which are thus held against the seams to secure tightness. There are no frames except the stem and sternpost, which are likewise sewed to the boat. No fastening is used except coir twine. The boat has a full convex bow with raking stem; short, flat bottom; flaring side, full stern; strongly raking sternpost; a rather strong sheer; eight crossbeams which extend beyond the gunwales and are notched to fit over the latter, thus making the sides more rigid; a sort of double platform at the bow; large single thole pins lashed on the sides; steering oar with comparatively long blade; other oars with short spade-shaped blades lashed to long, slim handles.

Dimensions of boat.—Length, 28 feet; beam, 10 feet; depth, 5 feet; length of bottom, 9 feet; width, 5 feet 6 inches; steering oar, 16 feet one-half inch; other oars vary in length from 14 feet 6 inches to 15 feet 3 inches. Scale of model, 1 inch equals 1 foot.

"The Madras masula mancha is used all along the eastern coast of the peninsula. It is formed with a flat bottom, for the purpose of taking the beach in the surf, when European boats can not approach it. These boats are beached in the third surf, and taken most completely out of the water, on the immediate receding of the swell, by the natives.

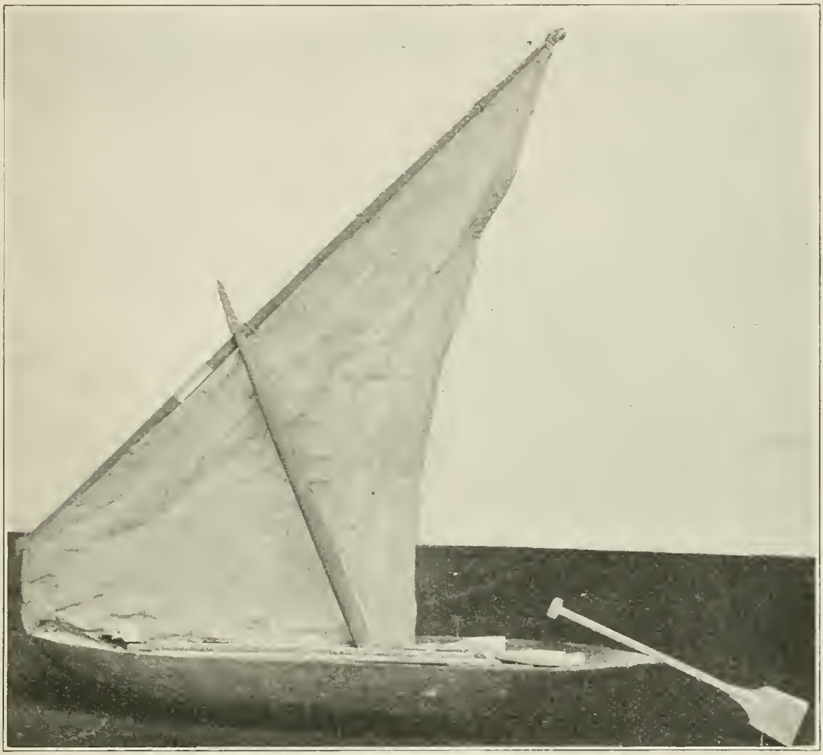


FIG. 89.—LACCADIVE ISLANDS CANOE.

"The planks * * * are sewed together with coir yarns, crossing the seams over a wadding of coir, which presses on the joints and prevents leakage. By this peculiar means of security the vessel is rendered pliable and yields to the shock which she receives on taking the ground, whilst boats with framed timbers and planks, nailed or treenailed fastened, would be broken to pieces from the heavy surf that at times runs as high as from six to ten feet.

"The masula boats receive their cargoes and passengers from the ships outside the surf and land them in perfect safety, provided the crew be treated civilly * * *. These boats are rowed by twelve men, in double banks, with bamboo paddles (a board about ten inches broad and fourteen inches long fixed to the end of a piece of bamboo). They are steered by two 'tindals' (coxswains), and two men are constantly kept to bail out the water, from which employment they are promoted to the paddle or bow oar, after which they fall aft in rotation, to be a 'tindal' or steersman. The steersman gives time by a song, which is sung by all the boatmen, and according as its modulations are slow or quick the oars are plied. * * *

"The masula boats are from thirty to thirty-five feet in length, ten to eleven feet in breadth, and seven to eight feet in depth."[17]

Gift of Surg. Gen. Francis Day. Cat. No. 160,155 U.S.N.M.

Jessor boat.

Double-ended boats of this peculiar form are used for fishing and for other purposes at Jessor, Bengal Presidency, India. They are built of teak and painted with gab. The oars are made in the usual East Indian manner by lashing the blades, which are flat on one side and convex on the other, to bamboo handles; the blades of the oars are made of sal wood (*shorea robusta*).

This is an open, carvel-built, keelless boat, with long pointed overhanging ends; round bilge; midship section being almost as round as the half of a cask; short and narrow flat mid section on bottom. The construction is peculiar. The planks, which are thick in comparison to the boat's size, are fastened together by clamps or iron staples clenched and countersunk on the opposite side from which they are driven. There are nine clamps to the foot. There are nine ribs or half frames on each side reaching nearly down to the bottom, and fastened to their upper ends is a strip of wood that runs around the boat inside of her gunwale and upon which rests the temporary bamboo deck. Crossing the bottom are nine battens which alternate with the ribs on the sides. Thirteen narrow crosspieces, like the thwarts of a boat, support and hold the sides together. Each end is covered or decked for a length of 3 feet, but the boat is otherwise open. When fishing it is decked with split bamboos, netted together, which are spread out as occasion requires.

Dimensions of boat.—Length over all, 35 feet 6 inches; beam, 5 feet 1 inch; depth amidships, 2 feet; height of ends, 3 feet 4 inches; oars, 7 feet long.

The shape of this boat suggests the vessels used by the ancient Egyptians. It has a close affinity in form to the modern fin-keeled racing yachts, and no doubt would sail very swiftly if its bottom was smooth and it was properly ballasted. It tapers from the midship section both vertically and horizontally, ending in a long pointed bow and stern, both somewhat higher than the middle. As it sits in the water not much more than half its length is submerged. It is propelled with two oars when engaged in fishing and steered with a long sweep shaped like an English made oar. No sails are used.

---

[17] Cyclopedia of India. Vol. 1, p. 558.

Gift of Surg. Gen. Francis Day. Cat. No. 160,320 U.S.N.M.

Jessor "donga."

A peculiar type of dugout constructed from the stem of the tar palm tree and used by the native fishermen of Jessor, Bengal Presidency, India.

This dugout is formed by excavating the soft portion of the palm stem and leaving only the outer layer, except at the smaller end where a narrow space has been left to prevent the water from entering. Its shape resembles that of a spoon with a deep bowl and a handle, concaved on one side and convex on the other. This form is due to the peculiar growth of the stem of the palm tree, which swells out into a rounded, bulb-like form at one end. "The broadly expanding base of the stem forms the prow or fore part of the canoe, and has a diameter of 2 feet 4 inches, while the narrow posterior portion is not more than 11 inches broad, the total length of this rude boat being 12 feet 10 inches."[18]

Gift of Surg. Gen. Francis Day. Cat. No. 160,318 U.S.N.M.

Model of Bengal fishing boat.

This peculiar type of dugout fishing canoe is employed at Chittagong, in the Bengal Presidency, India, as a sort of automatic fishing device, for which purpose it is specially equipped. It is a rough dugout, with round keelless bottom, cambered strongly at ends and tapering to narrow V-shaped bow and stern; fitted with a bamboo platform on one side, and net on the opposite side; ballasted with cement at one end.

Dimensions of canoe.—Length, 22 feet 2 inches; beam, 3 feet 3 inches; height, in center, 2 feet 2 inches. Fishing boats of this kind are generally 24 feet in length. Scale of model, 3 inches equal 1 foot.

When fishing, the boat is heeled so that the bamboo platform, which is fixed on its upper edge, projects into the water, and a string of palm leaves is attached to it in the form of a broom. This device has the effect of frightening the fish, which jump upon the half submerged bamboo platform, and thence into the boat, where they fall among the branches of trees, with which the canoe's bottom is strewn. The fisherman sits on the gunwale with one foot in the water to careen the canoe to the proper angle and give it the requisite motion to frighten the fish. To prevent the fish from leaping over the boat, the net is fixed obliquely or vertically along the opposite gunwale.

---

[18] Catalogue of Fishing Appliances from Bengal, 1883.

The bow of the canoe is heavily ballasted with sand or stones, and is thus kept low in the water; this facilitates the capture of fish, which can easily leap over the low gunwale. This plan for decoying fish is widely prevalent in certain parts of the Oriental countries, especially in Burmah and China.

Gift of Surg. Gen. Francis Day. Cat. No. 160,158 U.S.N.M.

Bengal dugout canoe.

A very primitive form of dugout canoe used at Patna, in the Bengal Presidency, India. It is locally known as "ekta," a term meaning one. It is a long, narrow dugout, made from the stem of the semul tree: nearly square in cross section; straight, nonflaring sides; long, flat bottom curving up at ends, which are projecting and square across the top; ends very thick and massive, and canoe generally thick and heavy, the interior being scooped out to conform only in a general way to the shape of the exterior. Small ridge left on bottom at bow and stern to simulate a rib; bamboo spars fastened along gunwale.

Dimensions of boat.—Length, 23 feet: width, 2 feet 2 inches; depth inside, 12 inches: height at same point from lower side of beam to top of gunwale, 18 inches; paddle made of teak, 6 feet 5 inches in length, the blade being 2 feet 10 inches long and 6 inches wide.

This type of dugout canoe is extensively used at Patna to operate a large triangular bag net, called "lahotree jal." In paddling the boatman stands or sits on the bottom of the canoe at the bow or stern and makes a stroke with his paddle, first on one side and then on the other.

Gift of Surg. Gen. Francis Day. Cat. No. 160,321 U.S.N.M.

East Indian coracle.

Coracles, locally called "parachal," are used in the rocky torrents of Bowani River, Coimbatore, India.

This is an open, circular, saucer-shaped coracle, with sloping sides, made by covering a light frame of split rattan with oilcloth; equipped with small, thin piece of wood for hand paddle.

Dimensions of coracle.—Diameter, 2 feet 10½ inches; depth, 7 inches; paddle, 6½ by 2½ inches.

Gift of Surg. Gen. Francis Day. Cat. No. 160,357 U.S.N.M.

Shola swimming float.

Swimming floats are used by the fishermen on the River Sind, in India, to support them in the water while they drift with the current and operate a large triangular scoop net called a *palla-net.* Two of these floats are used by a fisherman. When going on a fishing trip the fisherman enters the water, arranges one of these floats on each side, and then pushes out into midstream. When a fish is caught it is secured by a string that hangs from his waist. After drifting to the end of his reach he lands, shoulders his floats, his net, and his catch, and tramps back to sell his fish, unless he disposes of them to a "pally-chatty"—a boat in which natives go out to fish or to purchase the catch of others. This is among the most primitive devices for floatation known in the world.

A large bundle of stems of shola, a light pith-like plant, is securely bound together with twine, and to this is attached by a string a small bundle of the same material. The purpose of this arrangement is that, when the connecting string is passed beneath the arm of a fisherman and the small bundle of shola is placed in front of the armpit, the larger bundle is held on the shoulder of the swimmer; thus with one of these on each side he is supported without any personal exertion.

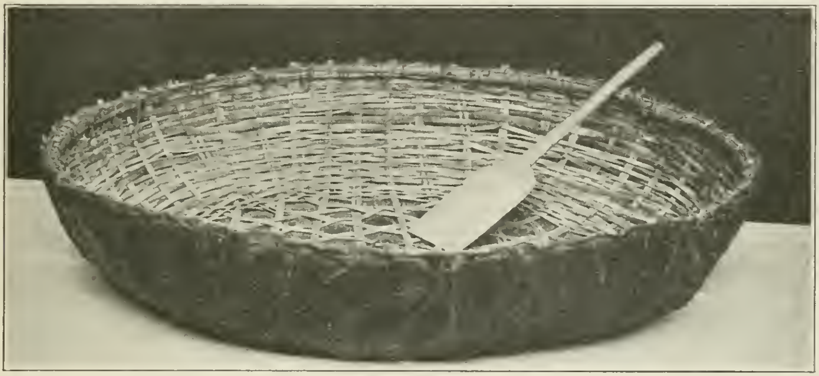


FIG. 90.—EAST INDIAN CORACLE OR "PARACHAL."

Dimensions of float.—Large bundle, 20 inches long, 6 inches diameter; small bundle, 7½ inches long, 3 inches diameter.

Gift of Surg. Gen. Francis Day. Cat. No. 160,263 U.S.N.M.

Model of Siamese barge.

This type of barge was used by the King of Siam in state processions or for other purposes. It is a long, narrow, very shallow, open, carvel-built, keelless boat, with narrow flat bottom; strongly cambered at ends, with round flaring sides; long, sharp, overhanging bow, projecting at bottom, with dragons carved on its sides, and carved, pointed end rising above, with strong afterrake; long, sharp, overhanging stern, rising very high and terminating in a profusely carved, pointed end, representative of a dragon's tail. The elaborate carving at bow and stern, as well as the outside of gunwales, is richly gilded; bottom of boat is black; inside, red. In the center of the boat is a gorgeously decorated and gilded pagoda in which the King sat; there are 32 thwarts for paddles.

Dimensions of boat.—Length over all, 65 feet; beam, 4 feet 6 inches; depth, 15 inches. Scale of model, 1 inch equals 1 foot.

A procession of these boats is described by eyewitnesses as a gorgeous pageant, and one that may well attract attention.

Gift of Siamese Centennial Commission.

Cat. No. 160,278 U.S.N.M.

Model of Japanese fishing boat.

A style of flat-bottomed boat, locally known by the typical name of "kawasaki," extensively, practically universally, employed in the trawl-line codfishery from the Island of Yesso or Hokkaido, in northern Japan. In the region where the fisheries are prosecuted most largely there are no harbors, and hence these boats have to put off from open shores, and often are compelled to land through a high-breaking surf.

This model represents a wooden, flat-bottom, keelless boat, with long, sharp bow; moderately flaring side; a stern with projecting sides, inside of which the rudder is hung; a long, narrow-bladed rudder projecting below the bottom; medium sheer; open; beams projecting from each side of boat, on the ends of which are tholes for the oars or sculls to work on; has one mast, which is adjustable, stepped some distance abaft the center of the boat—on this is set a large rectangular lugsail; the oars are peculiar, and are made of two pieces lashed together.

Dimensions of boat.—Length over all, 41 feet 10½ inches; beam, 10 feet; depth, 3 feet 6½ inches; mast, above gunwale, 25 feet; length of yard, 19 feet 1 inch; sail, 20 feet 10 inches high by 17 feet 1 inch wide; oars, 15 feet 10 inches long; blade of rudder, 5 feet 7½ inches long. Scale of model 1⅕ inches equal 1 foot.

It is said that the Japanese fishermen prefer flat bottom boats of this type for surf work. In beaching they run their boats on shore stern first, as the English cable is landed. They must often land on rocky shores, where the boats thump heavily in the surf. For this reason, the bottom of the "kawasaki" is very heavy, so that it may endure the wear and strain of successive poundings. The bottom is made by joining longitudinally two strips hewn from heavy planks of "katsura," a tree peculiar to Japan. The four pairs of ribs, cutwater, gunwale, ribband, and "kurokoberi," are made of oak; the planking is pine. Where cross grains are exposed to the weather, as on ends of timbers, they are either covered with sheet copper or coated with lacquer. Nail holes and seams are caulked with fiber of cedar bark. The sail is usually made of a very fine and stout kind of sedge matting—a sort of grass cloth—which, instead of being sewed together as sails are in America, are laced together in vertical breadths; they are baggy and belly out excessively in a fresh breeze.

The mast is supported only by a single forestay extending to the steam head; it can be easily taken down when it is necessary to use sculls, or when it must be replaced by a shorter mast, which is always kept on board for use in heavy storms. Sails are used only with a free wind. When sailing is impracticable, the boat is propelled by six sculls, which are worked on pegs in the projecting end of crossbeams extending beyond the gunwales. The method of sculling is peculiar. The Japanese do not row as Americans or Europeans do; they propel their boats by sculling, seldom or never lifting the oar blade from the water. They stand and keep a perfect stroke or time with their oars, which is more completely insured by the chanting or a monotonous refrain, "every alternate man swinging his body in opposite directions, one pushing the other pulling. The rowers thus vibrating half of them one way, and half the other, the boat is kept perfectly upright as she dashes through, or rather over, the water."

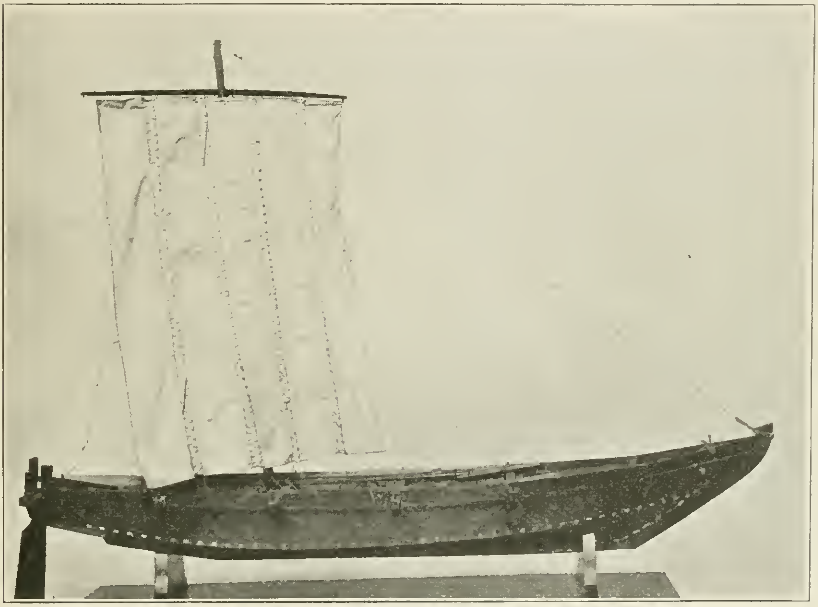


FIG. 91.—JAPANESE FISHING BOAT.

When fishing, the trawl lines are set from the boat, which usually runs along under short sail. The sail is lowered when the gear is hauled.

Gift of Japanese Columbian Exposition Commission.

Cat. No. 76,320 U.S.N.M.

Model of Japanese fishing boat.

This type of boat is used on the coast of Hokkaido in connection with the pound-net fishery for herring. Its native name is "waku-ami-bune," and its object is to support a bag net, into which the herring pass from the pound net.

The model represents an open, carvel-built (with flattened seams), keelless boat with sharp, flaring, overhanging bow; strongly raking stem, curved at top and rising above bow; stemhead coppered; narrow, flat bottom; rising floor; nearly vertical sides; bottom curved up strongly in after section; square stern, with projecting sides; large rudder, which extends far below the bottom; stout cross-beams; fitted to receive mast; short section forward housed in by thatched roof; equipped with bag net hung to both sides, bow and stern.

Dimensions of boat.—Length over all, 35 feet 10 inches; beam, 9 feet 4½ inches; depth, 2 feet 5 inches. Scale of model, 1⅓ inches equal 1 foot.

This boat, with its flat, bag-shaped net suspended under it, is considered the most striking feature of the pound-net fishery. It is placed at the closed end of the pound and the bag net is joined to the pound by one of its sides. When a shoal of herring enters the pound a boat at its entrance takes of the rope and draws up the net, and on its approaching the end up the pound the fishermen in the bag-net boat allow the joining line of the bag net and the pound to sink somewhat below the surface of the sea and the fish are passed on into the former. The joining line is then again raised and when, after repeating this process a number of times, the bag net is filled the boat leaves its post, to be taken by another, and rows for the coast, where the fish are bailed from the net after it is towed to the shore.

Gift of Japanese Columbian Exposition Commission.

Cat. No. 76,321 U.S.N.M.

Model of Japanese fishing boat.

A type of boat very generally used in the Japanese fisheries, more particularly in the circle net fishery for sardines, bonito, etc. It is one of a pair of boats used for operating a circle net. The model shows a wooden, keelless, open boat with long, sharp bow; straight, strongly raking stem; narrow flat bottom, cambered at after end; two strakes of side planks, the lower one rising at an angle of about 40° with the bottom and the upper strake nearly vertical: stern of the Japanese type, square with projecting sides, straight on top; crossbeams with tholes on ends forward and aft; none in midway; frame at stern for mast to rest on when sculls are used; also to lift the rudder; one large rectangular lug (or square) sail set on mast stepped abaft longitudinal center; fitted with oars, paddles, setting pole, four-pronged iron anchor, etc.

Dimensions of boat.—Length over all, 28 feet; beam, 5 feet; depth, 2 feet 2 inches; mast above gunwale, 17 feet 6 inches; yard, 9 feet 2 inches; sail, 18 feet 8 inches high by 9 feet wide. Scale of model, 1⅕ inches equal 1 foot.

The sail for a boat of this kind is made of grass cloth or fine matting; the edges of this cloth are weak, therefore each breadth is roped and the breadths are laced together instead of being sewn. The sail bags out when running free, the only way it can be used, hence its seeming great length. When going on to fish or to windward the sail and mast are lowered and sculls are used.

Gift of Japanese New Orleans Commission.

Cat. No. 160,163 U.S.N.M.

Model of Japanese fishing boat.

A form of rowboat in very general use in the fisheries of Japan. On the island of Yesso a boat similar to this type is locally called "hottsu." The "isobune" or common coast boat does not differ from it materially. It is a wooden, keelless, open rowboat with long, sharp bow, strongly raking stem; narrow, flat bottom, cambered aft, like American skipjack in cross section; V-shaped stern with side planks extending posteriorly beyond it; long, wide rudder; straight on top; model fitted with paddle, oar, poles, etc.

Dimensions of boat.—Length, 20 feet 5 inches; beam, 3 feet 9 inches; depth, inside, 18 inches; poles, 22 feet 6 inches long; oar, 13 feet; paddles, 8 feet 9 inches. Scale of model, 1⅕ inches equal 1 foot.

Gift of Japanese New Orleans Commission.

Cat. No. 160,164 U.S.N.M.

Model of Chinese merchant lorcha.

Swift-sailing junks of this type are used at Canton for carrying merchandise along the Chinese coast. Nearly all coasting junks were armed as a protection against pirates. This model is a carvel-built keel junk with long, sharp bow (with framework at top for raising and supporting anchors); raking curved stem; round bottom, easy bilge; convexly sharp stern, which curves up sharply from below and is divided to admit rudder and surmounted by overhanging platform, quarter galleries, etc.; keel extends from bow about three-fourths length of bottom; heavy drop rudder; very strong sheer;

flush deck; fitted with cabin trunk, capstan, two small brass cannons, etc.; carries three cotton lorcha sails; large flags, emblems, etc., on flagpoles above mastheads.

Dimensions of vessel.—Length over all, 67 feet; beam, 19 feet; depth, 6 feet; foremast, above deck, 34 feet; mainmast, above deck, 43 feet; mizzenmast, above rail (it is stepped in a wooden socket at port quarter rail), 26 feet. Scale of model, ½ inch equals 1 foot.

Gift of Chinese Centennial Commission.

Cat. No. 55,780 U.S.N.M.

Model of Chinese coasting junk.

A type of cargo boat used at Swatow, China, a treaty port at the mouth of the River Han, Province of Kwangtung, for the purpose of carrying freight on the river and for short distances on the coast. The cargo is protected by awnings or coverings of matting, like that shown on the model. They can sail only with a free wind.

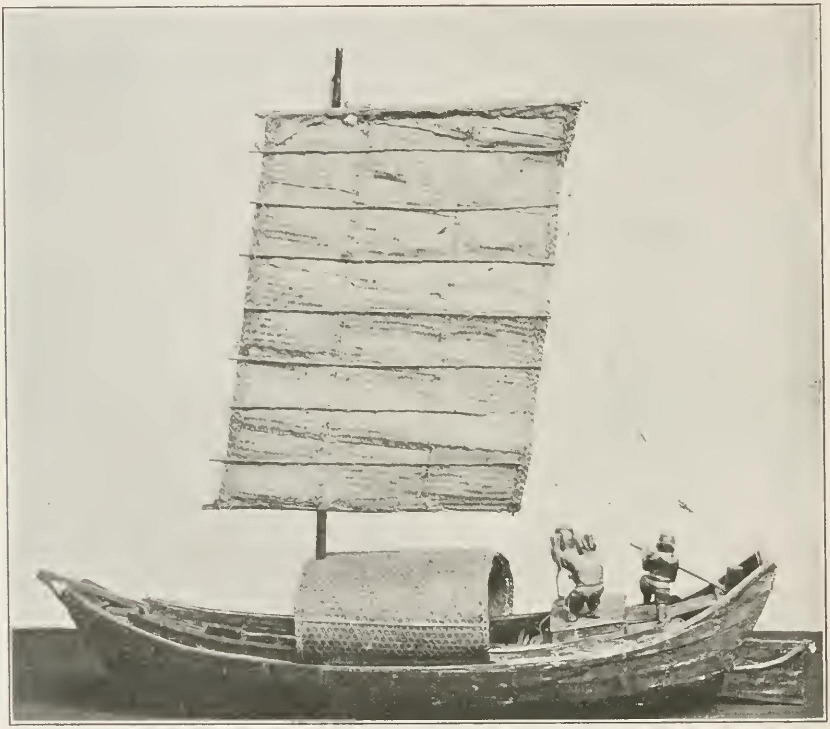


FIG. 92.—CHINESE COASTING JUNK.

The model represents a wooden, carvel-built, keelless, flat-bottom boat, with raking, square, scow-shaped ends, the bow being considerably narrower than the stern; round sides, curved somewhat toward bow and stern; strong sheer, especially at the ends, the bow and stern rising in an abrupt curve; wide rudder; open, except short spaces forward and aft, including cabin; washboards along the sides; provided with curved matting cover to space abaft mast; rigged with one mast and a single lorcha sail of matting attached to the mast by long loops, and trimmed by a crow's-foot sheet—a series of small ropes starting from a common center at the end of a larger rope which constitutes the sheet proper, and extending, one to each section of the leach of the sail, where it is intersected by one of its many bamboo yards. One of these ropes is also attached to the after end of the lower yard. The boat is fitted with oars, single-flued wooden anchor, etc.

Dimensions of boat.—Length over all, 40 feet; beam, 12 feet 8 inches; depth, amidships, 3 feet; height of mast, 37 feet; sail, 23 feet 4 inches high, 17 feet average width; oars of various lengths, from 14 feet 4 inches to 17 feet 8 inches. Scale of model, three-fourths inch equals 1 foot.

Gift of Chinese Centennial Commission. Cat. No. 160,144 U.S.N.M.

Model of Chinese monsoon junk.

A type of junk employed from Canton chiefly during the prevalence of monsoons, or eastern trade winds, and generally designated as a "monsoon junk." It is a wooden, carvel-built (in water-tight sections) sailing junk, with raking V-shaped square bow; keel for nearly half the length forward; except this, a round, keelless bottom, curving up sharply at stern; V-shaped square stern; large rudder, with holes in it, dropping below bottom; deep bulwark; decked; cabin aft; capstan for heaving up anchors, hoisting sails, etc.; lorcha rigged, carrying three sails.

Dimensions of junk.—Length over all, 63 feet; beam, 14 feet 6 inches; depth of hold, 6 feet 6 inches; foremast, above deck, 28 feet 6 inches; mainmast, above deck, 39 feet; mizzenmast, above deck, 22 feet 6 inches. Scale of model, one-half inch equals 1 foot.

The skag or keel forward gives a strong gripe, which is counterbalanced when the rudder is down. But when the rudder is lifted, which always precedes tacking, the junk quickly comes about on the opposite tack.

"These Junks make no more than one voyage a year, performing their passage in either direction during the favoring monsoon."[19]

Gift of Chinese Centennial Expedition. Cat. No. 55,779 U.S.N.M.

Model of Chinese sail and rowing boat.

This type of boat, which is one of the smallest classed as "cargo boat," is from Newchwang, Province of Shengking, China. When the wind is fair the sail is used, but with adverse winds the boat is propelled with oars.

---

[19] Report of the Wilkes Exploring Expedition.

The model represents a square-ended, flat-bottomed. scow-like, open boat. with bow considerably narrower than stern; bottom cambered: good sheer; upright washboards along middle section of gunwale on each side; single thole pins forward of these; two thwarts; single. square lorcha sail of cloth; large drop rudder; oars made of two pieces—oblong piece of board is fastened to a round handle.

Dimensions of boat.—Length, 16 feet; beam, amidships, 6 feet 9 inches; width of bow. 4 feet; of stern, 7 feet 6 inches; depth, top of gunwale to bottom, 2 feet 3 inches; mast, extreme length, 16 feet 6 inches; oars. one 11 feet and the other 12 feet 3 inches long. Scale of model, 1 inch equals 1 foot.

Gift of Chinese Centennial Commission. Cat. No. 55,771 U.S.N.M.

Model of Chinese cargo boat.

A roughly built, flat bottom, keelless boat, with square ends, strong sheer; hatchway with high coamings through center of deck; single mast; one square cloth sail. Equipped with four oars, three boat hooks. ane one three-pronged iron anchor.

Dimensions of boat.—Length. 31 feet 6 inches; beam, 11 feet; width of floor, 6 feet; depth, 3 feet; mast, 26 feet. Scale of model, 1 inch equals 1 foot.

Gift of Chinese Centennial Commission. Cat. No. 55,775 U.S.N.M.

Model of Chinese river cargo boat.

This type of flat-bottomed boat, of about 10 tons capacity, is used for transportation on the Liao River in the vicinity of Newchwang, China. The model shows a wooden, carvel-built, double-ended, flat-bottom boat; very narrow square ends; bottom strongly cambered, curving sharply upwards at each end: very little flare to sides; wide balance rudder; inclosed, partially decked space in longitudinal center about 14 feet long, open fore and aft of this; rigged with single mast and cloth lorcha sail, which trims the rudder head; fitted with three oars of the ordinary Chinese pattern, and three boat hooks for poling and pulling the boat through river reaches. Also has large four-flued iron anchor; this is weighed by the hawser which passes over a rude cathead (with pulley in its outboard end) that projects from the bow.

Dimensions of boat.—Length over all (exclusive of cathead), 33 feet; beam, extreme, 12 feet; depth, 3 feet; mast, extreme length, 28 feet 6 inches; sail, 15 feet 6 inches high by 13 feet 4½ inches wide;

two oars each 16 feet 3 inches long, one 14 feet long; boat hooks, from 15 feet 6 inches to 21 feet 9 inches long. Scale of model, 1 inch equals 1 foot.

Gift of Chinese Centennial Commission. Cat. No. 55,772 U.S.N.M

Model of Chinese "sampan."

A type of dugout used at Newchang, China. It is called "sampan" by the Chinese, since this is the generic name by which all boats are know. It is a long, narrow, round bottom, keelless dugout, with raking ends, square and projecting at top; entirely open: two cross bulkheads which divide the interior of canoe into three nearly equal parts; equipped with two boat hooks.

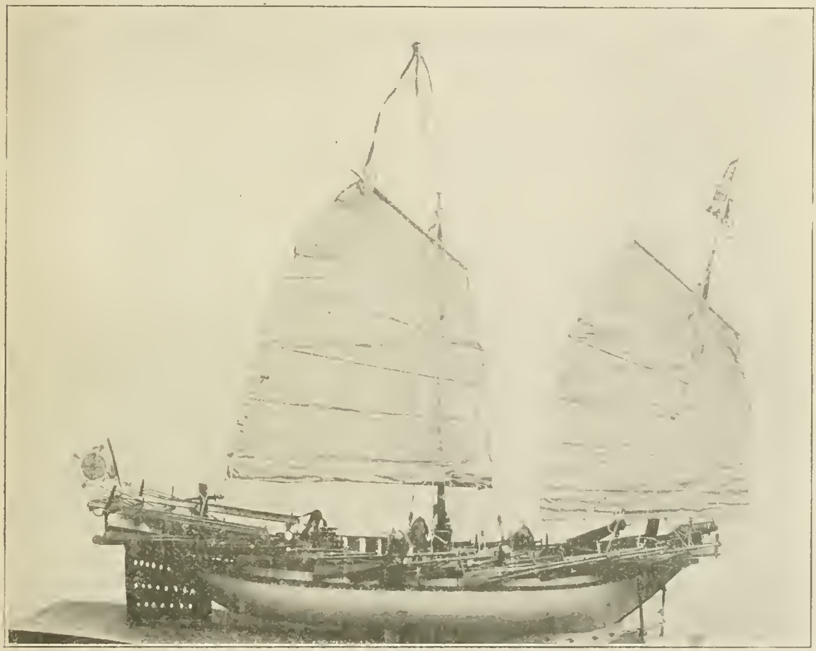


FIG. 93.—CHINESE RIVER BOAT.

Dimensions of canoe.—Length, 32 feet; beam, 2 feet 6 inches; width inside, 2 feet; depth inside, 16½ inches. Scale of model, 1 inch equals 1 foot.

Gift of Chinese Centennial Commission. Cat. No. 55,770 U.S.N.M.

Model of Chinese fishing boat.

Boats of this type are used in pairs for operating a dragnet, or sort of trawl. This model is a mate to the model No. 160,159 following, and is similar in form, construction, etc.

A wooden, round bottom, keelless boat of the junk pattern, with sharp overhanging bow, which has a narrow V-shaped square section at top; afterpart of bottom has strong camber; the ordinary junk stern; rudder drops below bottom; strong sheer; the bow and stern curve up abruptly; washboards with high coamings around open portion; has one large lorcha mat sail set on mast stepped about one-third boat's length from bow.

Dimensions of boat.—Length over all, 24 feet 1 inch; beam, 7 feet 8 inches; depth, 4 feet; mast, above gunwale, 23 feet; sail, 18 feet 8 inches high by 13 feet wide. Scale of mode, three-fourths inch equals 1 foot.

Gift of Chinese Centennial Commission. Cat. No. 160,160 U.S.N.M.

Model of Chinese fishing boat.

A wooden, round-bottom, keelless boat of the junk pattern, with sharp, overhanging bow, which has a narrow V-shaped square section at top; afterpart of bottom has strong camber; the ordinary junk stern; rudder drops below bottom; strong sheer; the bow and stern curve up abruptly; washboards with high coamings around open portion; has one large lorcha mat sail set on mast stepped about one-third boat's length from bow.

Dimensions of boat.—Length over all, 24 feet 1 inch; beam, 7 feet 8 inches; depth, 4 feet; mast, above gunwale, 23 feet; sail, 18 feet 8 inches high by 13 feet wide. Scale of model, three-fourths inch equals 1 foot.

Gift of Chinese Centennial Commission. Cat. No. 160,159 U.S.N.M.

Model of Formosan catamaran.

Rafts of this kind are used at Tamsui, Formosa. They are not taken to sea, but are used for fishing in harbors, rivers, or creeks. The crew usually consists of two men, one to row and one to fish. A stone is used for an anchor.

The raft is made by securely lashing together nine bamboo logs, the fastenings passing over six crossbars placed at intervals; running along each side, on top of these crosspieces, is bamboo so lashed as to form a sort of rail; platform of bamboo in the middle of raft.

Dimensions of catamaran.—Length, 23 feet 3 inches; width, 4 feet. Scale of model, two-thirds inch equals 1 foot.

Gift of Chinese Centennial Commission. Cat. No. 55,776 U.S.N.M.

Model of Chinese fishing boat.

This type of boat is used in China for fishing in streams, in a sort of automatic manner peculiar to oriental countries. It is a long, narrow, square-ended, round bottom, keelless dugout, with bottom curved up strongly at ends; three crosspieces or thwarts are flush with the gunwales; an arched cover or awning of basket work is at the stern; a net is arranged on two poles diagonally above the starboard side.

Dimensions of boat.—Length, 19 feet 7½ inches; width, 2 feet 3 inches; depth, inside, 15 inches; length of awning, 3 feet 8 inches; length of net, 10 feet 4½ inches; height, 3 feet 6 inches. Scale of model, 1 inch equals 1 foot.

When fishing, boats of this kind are fitted on one side with a broad platform painted white and a net elevated diagonally above the opposite gunwale. The fishing is conducted at night.

Gift of Chinese Centennial Commission.

Cat. No. 160,264 U.S.N.M.

Model of Chinese catamaran.

Catamarans of this type are used at Takow, Formosa, China. The extreme buoyancy of the bamboo and the strength and rigidity of the structure, due to the manner in which the logs are bound together, make this form of catamaran perhaps the best of any for use on a bar where there is a heavy surf.

Constructed of 13 bamboo logs placed side by side and securely fastened together by seizings or lashings of rattan which firmly bind seven crosspoles on top; also by lacings of rattan woven out and in between the logs on the forward part of the raft. The smaller ends of the bamboo logs are put at the bow and have a strong upward curve to enable the raft to more easily ride a sea. Along each side above the crosspieces, and securely bound there, is a small bamboo, forming a sort of gunwale; upon this are fastened two rowlocks, each with a single long thole, while the thole of another rowlock (which is secured to the after end of one of the logs) is seized to its after end. A heavy mast step is lashed to two crosspieces a little forward of amidships; in this the mast is stepped. A single lorcha sail of matting is carried. The raft is steered with an oar.

Dimensions of catamaran.—Length, 28 feet 4 inches; width, at bow, 7 feet 1 inch; amidships, 9 feet 9 inches; at stern, 10 feet 7½ inches; mast, above step, 24 feet 4½ inches; sail, 15 feet 1½ inches high by 12 feet 11 inches wide. Scale of model, 1½ inches equal 1 foot.

The bamboo catamarans used at Takow are of various sizes, but mostly from 30 to 35 feet long and 7 to 10 feet wide; they are made of from 12 to 14 bamboos. They are the chief means of communication with vessels in the roadstead; no foreign-fashioned boat, when a "bar" is on, could live through the surf.

They are made of large, partially burnt bamboos of equal size. Each catamaran has three leeboards, which are of great importance, since without them it would be unable to make way against the high seas or to sail close to the wind. The leeboards are used one in the center and the other two on the lee side, being simply inserted between the bamboo and drawn up when no longer required. A catamaran is also supplied with a screen of mat or rattan to protect the crew from the wind or sea; this is fastened in an upright position on the weather side aft. When not required for this purpose it is laid flat on the forward part of the raft, and thus serves as a sort of platform upon which are laid articles that require to be kept dry. When a catamaran is used to transport passengers a large tub is securely lashed near the stern and the passengers sit in this. But the tub is dispensed with when the boat is employed solely for fishing, and its place is taken by baskets in which the fish are put.

Three men constitute a crew. When rowing each man faces forward and uses two oars, which are pushed from the body instead of being pulled toward it as in the ordinary method of rowing. When the raft is sailing one man steers with an oar which is passed through a rattan becket, of which there are two at the stern of each catamaran. The steering oar is always placed in the lee becket.

Catamarans rarely upset in deep water, however heavy the sea may be. When they do capsize it usually occurs in crossing the bar inwards, as follows: Two or three high following seas strike the after part of the raft and lift it so high that the bow strikes the bottom, and then, before the catamaran can rise or recover itself, a heavy sea (or a succession of big waves) follows, forcing the bow of the craft still farther into the bottom, fairly turning it over, somewhat obliquely.

In deep water an anchor is used, but in shallow water a pole is usually thrust into the mud and the raft is made fast to it.

Cat. No. 160,146 U.S.N.M.

African dugout canoe.

This is a type of canoe used on the west coast of Africa, where the natives exhibit much skill in the management of their canoes. It is an open, sharp-ended, round bottom, keelless dugout canoe; the ends curve up from below and terminate in small pointed projections; canoe very thin and light.

Dimensions of canoe.—Length, 14 feet 6 inches; beam, 15 inches; depth, 12 inches.

Gift of Capt. Alfred Moloney, Surrey, Eng.

Cat. No. 160,338 U.S.N.M.

Model of grass boat of Senegambia.

This is a type of balsa used for crossing small rivers on the lower coast of Senegambia. The body is made of two cigar-shaped bundles of rushes firmly bound together with two-stranded rope and strongly curved up at ends; above the outer edges of these are two smaller bundles of nearly uniform diameter, so lashed as to increase the height on the sides and form a sort of hollow inside.

Dimensions of balsa.—Length, 18 feet 10 inches; width, 3 feet 1 inch.

This boat very closely resembles the grass balsas of South America. Boats of this kind are buoyant and are sometimes used for surf work.

Gift of Bureau of Arts, Paris. Cat. No. 127,997 U.S.N.M.

PART 5.

DESCRIPTION OF VESSELS AND BOATS OF PACIFIC ISLANDS.

Samoan fishing canoe.

A type of canoe used by the natives at Tutuila, Samoa, for bonita fishing. It is an open, sharp-ended, outrigged dugout canoe, with round bottom, one end rising in a long easy curve from the bottom, the other sharp and hollowed at the extremity, so that it projects forward at top and lower corner; small balance log attached to two outriggers; no sail; two paddles.

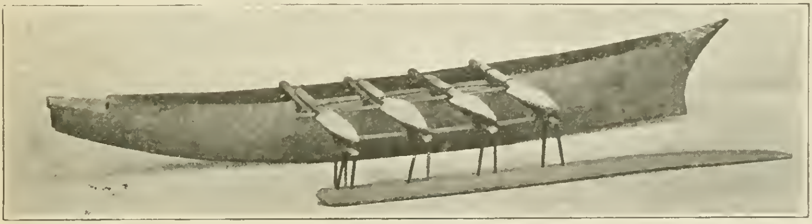


FIG. 94.—SAMOAN OUTRIGGER CANOE.

Dimensions of canoe.—Length, 23 feet 7 inches; width, 19 inches; depth, 16 inches; outriggers, outboard, 3 feet 8 inches; balance log, 13 feet 10 inches long, 4 inches diameter; paddles, 4 feet 4 inches long, 9 inches extreme width of blades.

Collected by T. D. Bolles. Cat. No. 160,333 U.S.N.M.

Model of Samoan outrigger canoe.

An open, sharp-ended dugout, having a sharp keellike bottom rising from near the center to the bow in a long easy curve. The stern is practically vertical. There are four outriggers close together, with their inner ends lashed to each gunwale and their outer ends lashed to a framework attached to the balance log. The balance log extends parallel to the dugout from a point opposite the stern, to a point about one-fourth the length of the dugout from the bow.

The bow is blunt except for a rounded underface and the stern is pointed.

Gift of L. W. Cartright. Cat. No. 307,200 U.S.N.M.

Samoan dugout canoe.

This type of canoe is used by the natives of Samoa for traveling, etc. It is an open, sharp-ended, keelless dugout canoe, with sharp floor, strongly cambered bottom; ends curved and rising in sharp points.

Dimensions of canoe.—Length, 26 feet 4 inches; beam, 14 inches; depth, 18 inches. Cat. No. 160.361 U.S.N.M.

Samoan outrigger canoe.

This type of outrigger canoe is one of the most commonly used by the natives at Apia, Samoan Islands, for fishing or for other purposes. It is dug out of the trunk of a tree and, being thoroughly dried, it will last for many years in good condition.

It has long, sharp ends, one of which is nearly vertical while the other has a long overhang, being almost cigar shaped; round, smooth bottom; good sheer.

Dimensions of canoe.—Length over all, 23 feet 2 inches; outside width, 17 inches; inside width, amidships, 13$\frac{3}{8}$ inches; depth, 12$\frac{5}{8}$ inches. Cat. No. 159.942 U.S.N.M.

Model of Tahitian outrigger canoe.

An open, sharp-ended dugout having a round bottom, which rises in a graceful curve from near the center to the bow. The stern is sharp, with a slightly raking stem. Planks laid crosswise from gunwale to gunwale are used as seats. Two outriggers made of trimmed tree branches are lashed to both gunwales, one near the bow and the other toward the stern. These are secured at their outer ends to the balance log, whose length is about three-quarters that of the canoe. The balance log is made of hibiscus wood and is pointed at both ends.

Tahitian outrigger canoes are made as long as 60 feet and carry upward of 50 men. If the log from which the canoe is to be made is not large enough, greater depth is obtained by means of additional pieces of wood sewed on with strong fiber and the seam caulked with gum from the breadfruit tree. The paddles used are broad and flat.

Gift of E. Lloyd Sechrist. Cat. No. 307,215 U.S.N.M.

Hawaiian fishing canoe.

Outrigger canoes of this kind were formerly quite extensively used for fishing and other purposes by the natives of Hawaii, in the Sandwich Islands, but in recent years they have been superseded by boats more conventional in their construction and better adapted to the needs of the fishermen.

This is an open, sharp-ended, round-bottomed, keelless dugout canoe, with low superstructure fastened to upper part of hull, and provided with small balance log lashed to the ends of two outriggers. It is rigged with a single mast and loose-footed spritsail.

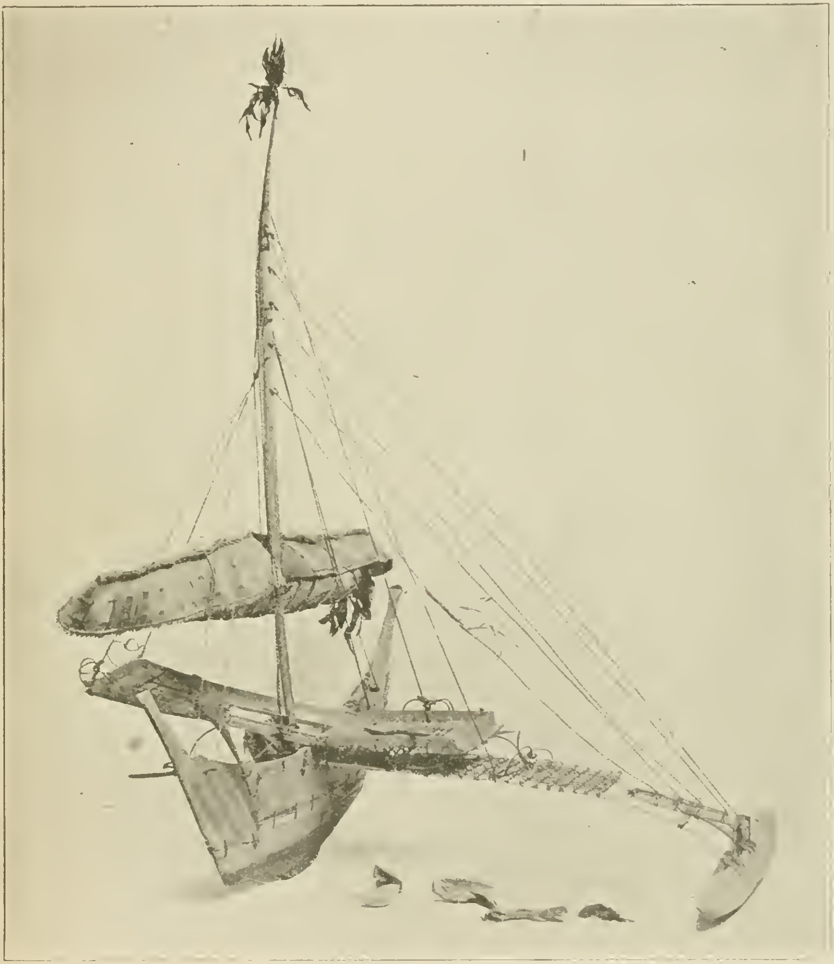


FIG. 95.—CAROLINE ISLANDS OUTRIGGER CANOE.

Dimensions of canoe.—Length, 19 feet 15½ inches; depth, 14 inches; outriggers outboard, 4 feet 5 inches; balance log, 8 feet 2 inches long.

Gift of Queen of Hawaii. Cat. No. 76,111 U. S. N. M.

Model of Caroline Island outrigger canoe.

This is a deep, narrow, double-ended canoe; V-shaped in cross section, with sharp raking ends; stem and sternpost projecting some distance above gunwale. It is made of irregular pieces of wood lashed together by seizings passing through the edges of the planks. There is a rude superstructure in the longitudinal center, from which extends on one side (which is always the lee side) a high short platform, and on the other a lower platform and six outriggers, at the ends of which is a balance log, which is firmly secured by lashings of grass rope. Four round sticks cross the outriggers at unequal distances and are firmly lashed, thus forming a sort of open platform upon which the natives may sit when the wind is strong and their weight is needed to windward to balance the canoe. There is a single mast stepped and stayed by shrouds to the outriggers and to the ends of the boat; rigged with a single lateen sail of coarse matting, arranged to brail; tuft of feathers on leach; large steering paddle, with lanceolate blade.

Dimensions of canoe.—Length, 21 feet 8 inches; beam, 3 feet 6 inches; depth, 3 feet 2 inches; outriggers, outboard, 9 feet 10 inches: balance log, 14 feet 8 inches; mast, above platform, 19 feet 4 inches; upper yard, 21 feet 4 inches; lower yard, 22 feet 2 inches; leach of sail, 18 feet 8 inches; paddle, 8 feet 10 inches. Scale of model, 1½ inches equal 1 foot. Cat. No. 160,174 U. S. N. M.

Model of Fiji Islands outrigger canoe.

A long sharply pointed, double-ended dugout canoe, with a superstructure attached to the lower or dugout section of the hull by lashings of twisted fiber. The upper part consists of vertical washboards along the middle section of the canoe, for about half its length, and a sort of whaleback deck at each end, the whole being rudely carved in lines. A balance log is attached to three outriggers by stanchions lashed to the latter end, with their lower ends entering the log at varying angles.

Dimensions of canoe.—Length, 24 feet 8 inches; width, 12 inches; depth, 18 inches; outriggers, outboard, 3 feet 6 inches; balance log, 13 feet 8 inches. Scale of model, 1½ inches equal 1 foot.

Collected by Isaac M. Brown. Cat. No. 23,962 U.S.N.M.

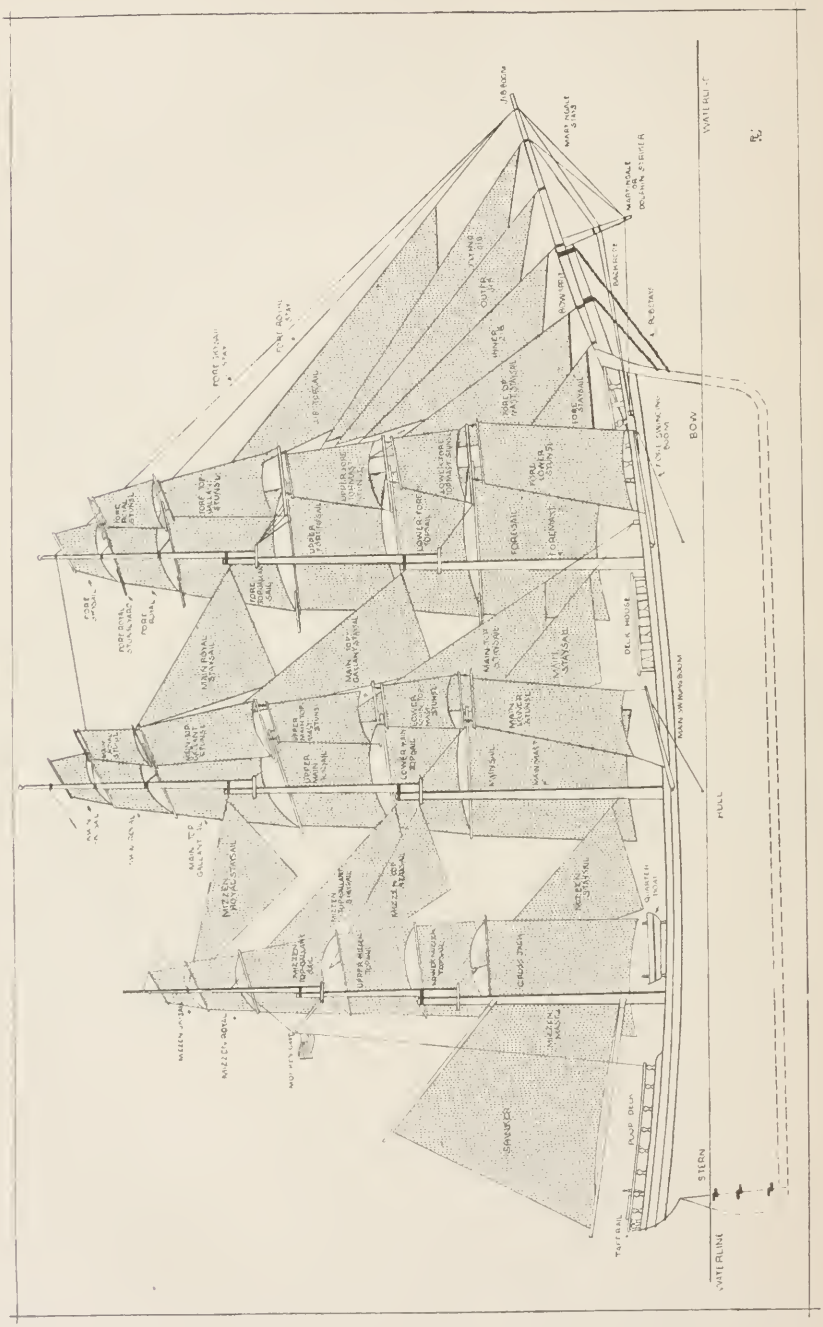

JIB BOOM
MARTINGALE STAYS
MARTINGALE OR DOLPHIN STRIKER
BACKROPE
BOWSPRIT
BOBSTAYS
FLYING JIB
OUTER JIB
INNER JIB
FORE TOPMAST STAYSAIL
FORE STAYSAIL
JIB TOPSAIL
FORE ROYAL STAY
FORE SKYSAIL STAY
FORE ROYAL STUNSL
FORE TOPGALLANT STUNSL
UPPER FORE TOPMAST STUNSL
LOWER FORE TOPMAST STUNSL
FORE LOWER STUNSL
FORE SWINGING BOOM
FORESAIL
FOREMAST
UPPER FORE TOPSAIL
LOWER FORE TOPSAIL
FORE TOPGALLANT SAIL
FORE ROYAL
FORE SKYSAIL
FORE ROYAL STUNSL YARD
BOW
MAIN ROYAL STAYSAIL
MAIN TOPGALLANT STAYSAIL
MAIN TOP STAYSAIL
MAIN STAYSAIL
DECK HOUSE
MAIN SWINGING BOOM
MAIN ROYAL STUNSL
MAIN TOPGALLANT STUNSL
UPPER MAIN TOPMAST STUNSL
LOWER MAIN TOPMAST STUNSL
MAIN LOWER STUNSL
MAINSAIL
MAINMAST
UPPER MAIN TOPSAIL
LOWER MAIN TOPSAIL
MAIN SKYSAIL
MAIN ROYAL
MAIN TOPGALLANT SAIL
HULL
MIZZEN ROYAL STAYSAIL
MIZZEN TOPGALLANT STAYSAIL
MIZZEN TOPMAST STAYSAIL
MIZZEN STAYSAIL
QUARTER BOAT
MIZZEN TOPGALLANT SAIL
UPPER MIZZEN TOPSAIL
LOWER MIZZEN TOPSAIL
CROSS JACK
MIZZEN SKYSAIL
MIZZEN ROYAL
MONKEY GAFF
MIZZEN MAST
SPANKER
POOP DECK
TAFFRAIL
STERN
WATERLINE

FIG. 96.—SAIL PLAN OF FULL-RIGGED SHIP.

GLOSSARY.

Bark.—A three-masted vessel having the foremast and mainmast square rigged and the mizzenmast fore-and-aft rigged.

Beam.—One of the heavy pieces of timber or iron set transversely across a vessel to support the decks and stay the sides; hence, the greatest width of a vessel.

Becket.—A device for holding spars, ropes, etc., in position, as a cleat, strap, loop, or rope.

Bilge.—The flat or nearly flat part of a ship's bottom, outside or inside.

Boom.—A spar holding the foot of a fore-and-aft sail.

Bowsprit.—A spar projecting forward and usually slightly upward from the bow of a vessel, resting upon the stem and the apron, and used to support the jib booms.

Brig.—A two-masted, square-rigged vessel.

Brigantine.—A two-masted vessel, brig-rigged except that it has a fore-and-aft sail extended by a gaff and boom.

Carvel-built.—Built with planks having the edges abutting each other.

Catamaran.—A long and narrow raft formed of two or more logs lashed together and cut away or turned up so as to form a bow, and sometimes carrying sails by aid of an outrigger.

Catboat.—A one-masted sailboat having its mast stepped well forward, carrying a single fore-and-aft sail extended by a gaff and boom.

Centerboard.—A movable vertical device, as of wood, pivoted or hung on a rod at the lower forward end and inclosed within the well or slot of a watertight compartment in the bottom of a vessel so that it can be lowered or raised to lessen the draft.

Clinker-built.—Built with planks (or rarely metal plates) having the edges overlapping and riveted together.

Clipper.—A sailing vessel built for speed, with fine lines; called also clipper ship.

Cuddy.—A small cabin, as in a lighter or barge. A cook's galley.

Dory.—A sharp, flat-bottomed rowboat much used by fishermen, sometimes rigged with sails.

Foremast.—The foremost mast of a vessel.

Gaff.—A spar for extending the upper edge of a stayless fore-and-aft sail and the lower edge of a gaff-topsail.

Hermaphrodite brig.—A two-masted vessel, square rigged on the foremast and with fore-and-aft rig on the mainmast.

Kaiak.—The hunting (or man's) canoe of arctic America, made of sealskins stretched over a pointed frame. Called "bidarka" by the Russians of Alaska.

Keelson.—A beam running lengthwise above the keel of a ship and bolted to the middle of the floor frames in order to stiffen the vessel

Ketch.—A strongly built two-masted vessel, formerly partly square-rigged forward, and often mounting mortars or guns for naval warfare.

Mainmast.—The principal mast of a vessel; the second mast from the bow in all vessels except yawls, galliots, and ketches.

Mizzenmast.—The mast next abaft the mainmast.

Oomiak.—An open boat made by drawing skins over a wooden frame and propelled by paddles, called women's boat because propelled by them.

Rake.—The inclination (usually backward, but sometimes forward) of a mast; also the inward slope of bow or stern from rail to keel.

Run.—The aft part of a ship's bottom where it fines off from the floor timbers to the sternpost.

Schooner.—A fore-and-aft rigged vessel having originally two masts, but now often three or more.

Sheer.—The rise, or the amount of rise from a level of the lengthwise lines of a vessel's hull.

Ship.—A large vessel with bowsprit and three (recently also with four or even five) masts, each of which carries square sails.

Ship jack.—A powerful hydraulic jack for raising vessels, as in launching and docking.

Sloop.—A single-masted fore-and-aft rigged vessel carrying a mainsail and jib, and often a staysail and gaff-topsail. As typically distinguished from a cutter it carries a centerboard and has a beam broad in proportion to the depth of keel; it also has a fixed bowsprit, topmast, and standing rigging.

Snow.—A two-masted square-rigged vessel having a boom mainsail traversing on the trysailmast instead of the mainmast, as in a brigantine.

Spar.—A round timber or pole by or on which to extend a sail.

Stem.—An upright timber or metal piece constituting the forward member of a vessel's hull, being a nearly vertical continuation of the keel, and in the same vertical plane. The bow of a vessel.

Sternpost.—The principal member of a vessel's stern frame; fastened below to the keel, and usually having the rudder hinged to its after edge.

Taffrail.—The rail around the stern of a vessel.

Thwart.—An oarsman's seat extending athwart or from side to side in an open boat.

Trice.—To raise with a rope or purchase, as the heel of a boom; also to tie, bind, or lash.

Yawl.—A small sailing vessel rigged like a sloop, with the addition of a jibber-mast.

INDEX.

[Abbreviations: U. S. A., United States of America; R. M., rigged model; B. M., builder's block model; Or., original.]

Page.

- *Aaron*, U. S. A., schooner, B. M. 98
- *Abby Watson*, U. S. A., brig, B. M. 88
- *Ada S. Allen*, U. S. A., schooner, B. M. 99
- *Adelita*, U. S. A., steam yacht, B. M. 106
- *Albatross*, U. S. A., steamship, R. M. 42
- *Albemarle*, U. S. A., bark, B. M. 82
- *Alice G. Wonson*, U. S. A., schooner, B. M. 166
- *Alice M. Jacobs*, U. S. A., steamship, R. M. 119
- *Amethyst*, U. S. A., brig, B. M. 85
- *Anita Owen*, U. S. A., hermaphrodite brig, B. M. 89
- *Antelope*, U. S. A., hermaphrodite brig, B. M. 90
- *Arrowsic*, U. S. A., schooner, B. M. 92
- *Atlantic*, U. S. A , steam tugboat, B. M. 68
- *Atticus*, U. S. A., merchant ship, 1818, B. M. 73
- Bajak, Sumatra, R. M. 253
- Balsa, Lake Titicaca, Peru, R. M. 224
  - Mexico, Or 217
  - Pyramid Lake, Nevada, U. S. A., Tule grass, R. M. 217
  - Senegambia, R. M. 284
- Baltimore clipper schooner, B. M. 164
- Barge, royal Siamese, R. M. 273
- Bark, U. S. A., *Albemarle*, B. M. 82
  - *Crusader*, B. M. 81
  - *Edward Koppisch*, B. M. 80
  - *Hesper*, B. M. 81
  - *Julia*, B. M. 82
  - *Saone*, B. M. 80
  - *William Schroeder*, B. M. 79
- Bidar, India, lugrigged, R. M. 255
- Bidarka, Aleutian Islands, three-hole, Or 210
  - three-hole, R. M. 210
  - two-hole, R. M. 210
  - Or 209
  - Kodiak Island, Alaska, R. M. 212
- Block Island boat, U. S. A.. cat-rigged, R. M. 190
- Boat, China, R. M. 280
  - China, single lorcha sail, R. M. 279, 280
  - Greece, R. M. 245
  - Japan, R. M. 277
  - India, cargo, "masula," R. M. 268
  - India, Or 270
  - Norway, six oars, R. M. 240
  - Turkey, six oars, "caique," R. M. 246
- Boston cutter, U. S. A., after Irish "Galway hooker," R. M. 179
- *Break O'Day*, U. S. A., schooner, B. M. 162
- *Breeze*, U. S. A., schooner, oyster, B. M. 175
- Brig, U. S. A., *Abby Watson*, B. M. 88
  - *Amethyst*, B. M. 85
  - Block model 86
  - *Chenamus*, B. M. 86
  - *Dove*, B. M. 83
  - *Eva M. Johnson*, B. M. 90
  - *Palos*, B. M. 84
  - *Powhatan*, B. M. 84
  - *Telula*, skeleton model 87
  - *Watson*, B. M. 87

Page.

- Bugeye, U. S. A., Chesapeake Bay, *Lillie Sterling*, B. M. 175
  - Chesapeake Bay, *Lilly Sterling* 156
  - R. M. 155
- Bull boat, North America, coracle, Or 206
- Caique, Turkey, pleasure boat, R. M. 246
- *Cambrai*, U. S. A., steamship, 1920 69
- *Camille*, U. S. A., steamship 118
- Canoe, bark, South America, R. M. 224
  - Strait of Magellan, R. M. 223
  - birch bark, Alaska, R. M. 215, 216
    - Alaska, Tinneh Indians, Or 215
    - Canada, Mic Mac Indians, R. M. 216
    - U. S. A., Maine, Passamaquoddy Indians, Or 214
    - U. S. A., Washington State, Kootenay Indians, Or 215
    - U. S. A., Wisconsin, Ojibwa Indians, Or 214
  - dugout, U. S. A., Chesapeake Bay, "cunner," R.M 203
    - Louisiana, "pirogue," Or 205
    - North Carolina, R. M. 204
    - Pacific Coast, after Chinese, R. M. 205
    - R. M. 204
  - outrigger, Malay, R. M. 249
  - wood, clinker, U. S. A., *Sairy Gamp*, Or 114
  - wood, clinker, U. S. A., two-mast, lateen sails, R. M. 114
- Catamaran, Brazil, "jangada," R. M. 222
  - Ceylon, R. M. 247, 248
  - Formosa, R. M. 282, 283
  - Malay, R. M. 262
- Catboat, U. S. A., Florida, R. M. 200
  - New England, R. M. 187
  - Marthas Vineyard, R. M. 186
  - New England, "pea pod," R. M. 187
    - "quoddy," R. M. 192
      - B. M. 195
      - *Yankee Hero:*
        - B. M. 195
        - R. M. 192
  - R. M. 178
  - Rhode Island, R. M. 185
  - New England, "reach-boat," R. M. 187
- *C. Chase*, U. S. A., schooner, Baltimore clipper, B. M. 157
- Champlong, Java, lug-rigged, R. M. 264
- *Charmer*, U. S. A., schooner, B. M. 98

Page.
Chebacco boat, U. S. A., pinky, R. M. 132
  Lion, R. M. 128
Chenamus, U. S. A., brig, B. M. 86
City of Havana, U. S. A., smack, B. M. 169
City of Key West, U. S. A., schooner, R. M. 152
Clermont, U. S. A., steamship, Robert Fulton's, 1807, R. M. 58
Clipper sailing packet, U. S. A., *Comet*, B. M. 76
  St. Matthew, R. M. 73
  Young America, B. M. 77
Columbia River boat, U. S. A., sprit sail, R. M. 188
Coquette, U. S. A., yacht, B. M. 108
Coracle, India, Or. 272
  Ireland, Or. 226
  North America, Or. 206
  Scotland, Or. 226
Cornelius Howland, U. S. A., bark, B. M. 125
Crusader, U. S. A., bark, B. M. 81
Cuba, U. S. A., steamship, R. M. 62
Curragh, Ireland, Or. 225
Dancing Feather, U. S. A., schooner, pilot boat, B. M. 104
Dauntless, U. S. A., schooner, R. M. 138
David F. Low, U. S. A., schooner, B. M. 168
David R. Proctor, U. S. A., schooner, B. M. 158
Decatur, U. S. A., steamship, B. M. 65
Dogbody Chebacco boat, U. S. A., R. M. 132
Dory, U. S. A., R. M. 201, 202
Dove, U. S. A., brig, B. M. 83
D. R. Proctor, U. S. A., schooner, R. M. 135
D. S. Lawrence, U. S. A., schooner, B. M. 100
Dugout boat, Boyan, square sail, "kolik," R. M. 260
  Ceylon, R. M. 246, 247
  China, "sampan," R. M. 281
    R. M. 282
  India, "katayap" R. M. 262
    lug-rigged, "fast boat," R. M. 257
    "prau nadi," R. M. 260
    "sampan panjang," R. M. 257, 260
    "sampan," R. M. 258
Dugout Canoe, Africa, West Coast, Or. 284
  Alaska, Or. 218, 219
    R. M. 219, 220
  Brazil, two-mast, R. M. 222
  British Columbia, Nootka Indians, Or. 221
  British Guiana, "piragua," R. M. 223
  Caroline Islands, outrigger, R. M. 287
  Ceylon, "ballam," R. M. 246
  Fiji Islands, outrigger, R. M. 288
  Hawaii, outrigger, Or. 286
  India, "ekta," Or. 272
    "jalor penjala," R. M. 259
    lateen rig, "tony," R. M. 266
      R. M. 271
    spoon-shaped, "donga," Or. 271

Page.
Dugout Canoe, Laccadive Islands, lateen rig, R. M. 267, 268
  Malay, R. M. 260
  Rhio, square sail, "kolik," R. M. 263
  Samoan Islands, Or. 285, 286
    outrigger, Or. 286
    outrigger R. M. 285
  Tahiti, outrigger, R. M. 286
  U. S. A., California, Hupa Indians, R. M. 217
    Pacific Coast, Haida Indians, R. M. 220, 221
    Virginia, Or. 218
    Wisconsin, Or. 217
Dutch sailing ship, seventeenth century, R. M. 71
E. Closson, U. S. A., schooner, B. M. 99
Edward Koppisch, U. S. A., bark, B. M. 80
Edwin Forrest, U. S. A., schooner, pilot boat, B. M. 104
Ekta, India, dugout canoe, Or. 272
Elisha Holmes, U. S. A., schooner, R. M. 136
English sailing ship, seventeenth century, R. M. 70, 120
Ericsson, John, screw propeller on S. S. *Robert F. Stockton*, model 64
Etta G. Fogg, U. S. A., schooner, B. M. 161
  R. M. 138
Eva M. Johnson, U. S. A., brig, B. M. 90
Exporter, U. S. A., merchant ship, B. M. 78
"Fast boat," India, R. M. 257
Felucca, U. S. A., Italian type, R. M. 194
Ferryboat, Ceylon, two covered dugouts, R. M. 247
  U. S. A., horse treadmill, 1813, R. M. 103
Fish Hawk, U. S. A., R. M. 43
Fitch, John, steamboat, 1786, R. M. 48
Flatboat, U. S. A., Ohio River, 1800, R. M. 102
Float, India, shola stems, R. M. 272
Florence, U. S. A., schooner, pilot boat, B. M. 104
Flying Fish, U. S. A., schooner, B. M. 163
  R. M. 46, 140
Fredonia, U. S. A., hermaphrodite brig, B. M. 89
  schooner, R. M. 145
Fulton, Robert, U. S. A., steamboat, *Clermont*, 1807 58
Galena, U. S. A., schooner, B. M. 164
Glasgow, U. S. A., merchant ship, 1835, B. M. 74
Glyn, U. S. A., schooner, pilot boat, B. M. 106
Golden Gate, U. S. A., steamship, R. M. 116
Grampus, U. S. A., schooner, R. M. 45
Grass boat, Africa, Senegambia, balsa, R. M. 284
  Mexico, balsa, R. M. 217
  U. S. A., Nevada, balsa, R. M. 217
Grey Eagle, U. S. A., Ohio River, steamboat, R. M. 64
Harvest Home, U. S. A., schooner, B. M. 167
Helen, U. S. A., schooner, B. M. 101
Helen M. Foster, U. S. A., schooner, B. M. 165
Hermaphrodite brig, U. S. A., *Anita Owen*, B. M. 89

Page.

- Hermaphrodite brig, U. S. A., *Antelope*, B. M. 90
  - Block model 83
  - *Fredonia*, B. M. 89
  - *George Latimer, Alexander Kirkland*, B. M. 89
  - *Hurricane Bird*, B. M. 90
  - *Iscarian*, B. M. 88
  - *I. W. Parker*, B. M. 91
  - *Minnie Smith*, B. M. 91
- *Hesper*, U. S. A., bark, B. M. 81
  - schooner, pilot boat, B. M. 105
- *Howard*, U. S. A., schooner, B. M. 168
- *Hunter*, U. S. A., schooner, B. M. 101
- *Iscarian*, U. S. A., hermaphrodite brig, B. M. 88
- *Ivanhoe*, U. S. A., schooner, B. M. 170
- *I. W. Parker*, U. S. A., hermaphrodite brig, B. M. 91
- Jalor penjala, India, dugout canoe, R. M. 259
- *James A. Garfield*, U. S. A., schooner, R. M. 145
- *James M. Riley*, U. S. A., schooner, three-mast, B. M. 93
- *J. Coolidge*, U. S. A., schooner, B. M. 160
- *Jeff Brown*, U. S. A., Florida, "smackee" R. M. 183
  - "smackee," welled, B. M. 189
- *Jemima Boomer*, U. S. A., steamship, R. M. 118
- *Jeremiah Swift*, U. S. A., schooner, R. M. 117
- *Jireh Swift*, U. S. A., bark, whaler, B. M. 124
- *J. L. Carroll*, U. S. A., schooner, R. M. 153
- *John Bird*, U. S. A., schooner, three-mast, B. M. 93
- *John Bull*, England, cutter yacht, R. M. 111
- *John J. Flaherty*, U. S. A., schooner, R. M. 147
- *John M. Smart*, U. S. A., schooner, B. M. 170
- *John N. Cushing*, U. S. A., merchant ship, B. M. 76
- *John W. Lowe*, U. S. A., smack, R. M. 151
- *Julia*, U. S. A., bark, B. M. 82
- *July*, U. S. A., pinky schooner, B. M. 156
- Junk, China, coasting service, R. M. 278
  - lorcha sail, R. M. 282
  - monsoon service, R. M. 279
  - three lorcha sails, R. M. 277
- *J. W. Hale*, U. S. A., schooner, B. M. 97
- Kaiak, Alaska, Cape Blossom, Or. 207
  - Cape Espenberg, Or. 207
  - Kings Island, Or. 209
  - Kusilvak, Or. 208
  - Nunivak Island, Or. 209
  - St. Michaels, Or. 208
  - Unalaklik, Or. 209
  - Greenland, Original 212
    - Rigged model 209, 213, 214
- *Kara*, U. S. A., steam launch, B. M. 108
- Katayap, India, dugout boat, R. M. 262

Page.

- Keel boat, Ohio River, 1800, R. M. 102
- Ketam batu, Malay, R. M. 261
- Ketch, U. S. A., 1713, R. M. 125
  - *Resolute*, B. M. 175
    - R. M. 149
- Kolik, Boyan, dugout boat, R. M. 260
  - Rhio, dugout canoe with square sail, R. M. 263
- Lanchang, Sumatra, type of "prahu," R. M. 254
- Lanon, India, like "prahu," R. M. 255
- Launch, U. S. A., steam, B. M. 41, 68, 120
  - *Kara*, B. M. 108
- *Laura Roberts*, U. S. A., schooner, B. M. 163
- *Lion*, U. S. A., chebacco boat, R. M. 128
- *Lillie*, U. S. A., schooner, B. M. 105
- *Lillie Sterling*, U. S. A., bugeye, B. M. 175
- *Lilly Sterling*, U. S. A., bugeye, R. M. 156
- *Lizzie F. Choate*, U. S. A., schooner, B. M. 166
- *Lizzie W. Matheson*, U. S. A., schooner, three-mast, B. M. 174
- *Lookout*, U. S. A., schooner, B. M. 161
- *Lucy*, U. S. A., schooner, B. M. 96
- Lugger, Gulf of Mexico, R. M. 184
- *Mable F. Staples*, U. S. A., schooner, B. M. 100
- Machva, India, R. M. 264
- Marblehead banker, U. S. A., schooner, R. M. 127
- *Marcia Tribou*, U. S. A., schooner, B. M. 96
- Marine engine, 1804, Stevens, Or. 50
- *Mary Fernald*, U. S. A., schooner, R. M. 140
- *Mary O'Dell*, U. S. A., schooner, R. M. 140
- Masula, India, cargo boat, R. M. 268
- *May Queen*, U. S. A., schooner, B. M. 162
- Melon seed, U. S. A., R. M. 114
- Merak, India, ship, R. M. 256
- Merchant ship, Canada, B. M. 79
  - U. S. A., *Atticus*, 1818, B. M. 73
    - Block model, 1830 74
      - 1850 75
      - 1876 79
    - *Exporter and Reporter*, 1874, B. M. 78
    - *Glasgow*, 1835, B. M. 74
    - *John N. Cushing*, 1853, B. M. 76
    - *Mayflower*, B. M. 75
    - *Oregon*, B. M. 78
- Meteor, U. S. A., steamship, B. M. 66
- *M. E. Torry*, U. S. A., schooner, B. M. 167
- *Meyer and Muller*, U. S. A., schooner, three-mast, B. M. 94
- *Miantonomoh*, steam monitor, B. M. 41
- *Minnie Smith*, hermaphrodite brig, B. M. 91
- Monhegan fishing boat, U. S. A., schooner-rigged, R. M. 178
- *Mountain Laurel*, U. S. A., schooner, B. M. 99
- *Mount Vernon*, U. S. A., schooner, old style, R. M. 134
- *Nautilus*, U. S. A., bark, B. M. 123
- *Nellie Coleman*, U. S. A., schooner, B. M. 173
- *Nellie S. Pickering*, U. S. A., schooner, B. M. 93
- *Nimbus*, U. S. A., schooner, B. M. 167
- No Man's Land boat, U. S. A., cat-rigged:
  - B. M. 190
  - R. M. 190
- *North Star*, U. S. A., schooner, B. M. 97

Page.

- *Novelty*, U. S. A., B. M. 119
- Ohio River flatboat, 1800, R. M. 102
  - keel boat, 1800, R. M. 102
- *Ohio*, U. S. A., steamboat, B. M. 66
- *Olata*, U. S. A., yacht, B. M. 109
- *Onward*, U. S. A., bark, B. M. 123
- Oomiak, Alaska, square sail, R. M. 210
  - Hudson Bay, R. M. 211
- *Open Sea*, U. S. A., Marblehead banker, schooner, R. M. 131
- *Orca*, U. S. A., screw steamer, R. M. 115
- *Oregon*, U. S. A., merchant ship, B. M. 78
- *Orleans*, U. S. A., Ohio River steamboat, R. M. 60
- *Palos*, U. S. A., brig, B. M. 84
- Pea pod, U. S. A., cat-rigged boat, R. M. 187
- Pediwak, Celebes, lug-rigged ship, R. M. 263
- Penchalang, India, lug-rigged ship, R. M. 256
- Peruvian grass boat, balsa, R. M. 224
- *Philadelphia*, U. S. A., steamship, R. M. 68
- *Phoenix*, U. S. A., steamboat, John Stevens, 1808, R. M. 59
- Pilot boat, U. S. A., *Dancing Feather*, B. M. 104
  - *Edwin Forrest*, B. M. 104
  - *Florence*, B. M. 104
  - *Glyn*, B. M. 106
  - *Hesper*, B. M. 105
  - *Lillie*, B. M. 105
  - *Phantom*, *Pet*, B. M. 165
- Pinky schooner, U. S. A., *July*, B. M. 156
  - Rigged model 129
  - *Tiger*, R. M. 133
  - *Trenton*, B. M. 157
- Pirogue, U. S. A., Or. 205
- *Powhatan*, U. S. A., brig, B. M. 84
- Prahu, Malay, R. M. 250, 251
- Prau nadi, India, R. M. 260
- *Princess*, U. S. A., steam yacht, B. M. 107
- Pungy, U. S. A., Chesapeake Bay, *W. F. McKewen*, R. M. 152
- Purse-seine boat, U. S. A., R. M. 197
- *Rattler*, U. S. A., steam tugboat, R. M. 65
- *R. B. Sumner*, U. S. A., schooner, B. M. 97
- Reach boat, U. S. A., cat-rigged, R. M. 187
- *R. F. Stockton*, U. S. A., steamboat, R. M. 63
- *Reindeer*, U. S. A., bark, B. M. 124
- *Resolute*, U. S. A., ketch, B. M. 175
  - R. M. 149
- *Ripple*, U. S. A., schooner, B. M. 160
- *Rob Roy*, U. S. A., schooner, R. M. 148
- *Roulette*, U. S. A., schooner, B. M. 173
- Rowboat, U. S. A., Adirondacks, N. Y., R. M. 113
  - Au Sable, N. Y., R. M. 113
  - Fish lighter, Potomac River, R. M. 203
  - Gill-net boat, Cedar Keys, Fla., R. M. 202
  - Potomac River seine boat, R. M. 189
  - Whitehall, N. Y., R. M. 113
- *Royal*, U. S. A., steam schooner, R. M. 117
- Rumsey's steamboat, U. S. A., 1784, R. M. 47
- *Ruth Thomas*, U. S. A., schooner, skeleton model 91

Page.

- *Sairy Gamp*, U. S. A., canoe, Or. 114
- Sampan, China, dugout boat, R. M. 281
- Sampan panjang, India, R. M. 257
- *Saone*, U. S. A., bark, B. M. 80
- *Sarah H. Cressy*, U. S. A., schooner, B. M. 165
- *Sarah Hill*, U. S. A., schooner, B. M. 163
- *Savannah*, U. S. A., steamship, R. M. 61
- Schooner, Bahama Islands, two mast, R. M. 205, 206
- Schooner, U. S. A., *Aaron*, B. M. 98
  - *Ada S. Allen*, B. M. 99
  - *Alice G. Wonson*, B. M. 166
  - *Arrowsic*, *Eagle*, B. M. 92
  - Baltimore clipper, *C. Chase*, B. M. 157
  - Block model 98
  - *Break O'Day*, B. M. 162
  - *Breeze*, B. M. 175
  - *Charmer*, B. M. 98
  - Chesapeake Bay, R. M. 153, 154
  - *City of Key West*, R. M. 152
  - *Dancing Feather*, pilot boat, B. M. 104
  - *Dauntless*, R. M. 138
  - *David F. Lowe*, B. M. 168
  - *David R. Proctor*, B. M. 158
  - *D. R. Proctor*, R. M. 135
  - *D. S. Lawrence*, B. M. 100
  - *E. Closson*, B. M. 99
  - *Edwin Forrest*, pilot boat, B. M. 104
  - *Elisha Holmes*, R. M. 136
  - *Etta G. Fogg*, B. M. 161
    - R. M. 138
  - *Florence*, pilot boat, B. M. 104
  - *Flying Fish*, B. M. 163
    - R. M. 46, 140
  - *Fredonia*, R. M. 145
  - *Galena*, B. M. 164
  - *Glyn*, pilot boat, B. M. 106
  - *Grampus*, R. M. 45
  - *Harvest Home*, B. M. 167
  - *Helen*, B. M. 101
  - *Helen M. Foster*, B. M. 165
  - *Hesper*, pilot boat, B. M. 105
  - *Howard*, B. M. 168
  - *Hunter*, B. M. 101
  - *Ivanhoe*, B. M. 170
  - *James A. Garfield*, R. M. 145
  - *James M. Riley*, *Susan P. Thurlow*, three masted, B. M. 93
  - *J. Coolidge*, B. M. 160
  - *John Bird*, three masted, B. M. 93
  - *John J. Flaherty*, R. M. 147
  - *John M. Smart*, B. M. 170
  - *July*, pinky, B. M. 156
  - *J. W. Hale*, three masted, B. M. 97
  - *Laura Roberts*, B. M. 163
  - *Lillie*, pilot boat, B. M. 105
  - *Lizzie F. Choate*, B. M. 166
  - *Lizzie W. Matheson*, B. M. 174
  - *Lookout*, B. M. 161
  - *Lucy*, three masted, B. M. 96
  - *Mable F. Staples*, B. M. 100

Page.

- Schooner, U.S A., Marblehead banker, R. M. 127
  - *Marcia Tribou*, B. M. 96
  - Market, R. M. 147
  - *Mary Fernald*, R. M. 140
  - *Mary O'Dell*, R. M. 140
  - *May Queen*, B. M. 162
  - *M. E. Torrey*, B. M. 167
  - *Meyer and Muller*, three masted, B. M. 94
  - Monhegan fishing boat, R. M. 178
  - *Mountain Laurel*, B. M. 99
  - *Mount Vernon*, R. M. 134
  - *Nellie Coleman*, B. M. 173
  - *Nellie S. Pickering*, three masted, B. M. 93
  - *Nimbus*, B. M. 167
  - No name, B. M. 172, 173
  - *North Star*, B. M. 97
  - *Open Sea*, Marblehead banker, R. M. 131
  - *Phantom*, *Pet*, B. M. 105
  - *R. B. Sumner*, B. M. 97
  - *Ripple*, B. M. 160
  - *Rob Roy*, R. M. 148
  - *Roulette*, B. M. 173
  - *Ruth Thomas*, skeleton model 91
  - *Sarah Hill*, B. M. 163
  - *Sarah H. Cressy*, B. M. 165
  - *Senator Gardner*, R. M. 148
  - *Spencer F. Baird*, R. M. 143
  - *Sunny South*, B. M. 176
  - *Susan Center*, B. M. 158
  - *Sylph*, B. M. 164
    - R. M. 136
  - *Thomas E. Evans*, B. M. 166
  - Three mast, R. M. 144
  - Two mast, New England, R. M. 139
  - *Wakeag*, B. M. 96
  - *Watchman*, B. M. 95
  - *Webster Sanborn*, B. M. 169
  - *We're Here*, B. M. 162
  - *William C. French*, three mast, B. M. 95
  - *William Frederic*, three mast, B. M. 94
  - *William H. Archer*, B. M. 100
  - *William M. Gaffney*, R. M. 142
  - Yacht, R. M. 110
- *Senator Gardner*, U. S. A., schooner, R. M. 148
- Sharpie, U. S. A., Atlantic Coast, cat-rigged, B. M. 198
  - Atlantic Coast, cat-rigged, R. M. 196, 199
  - Great Lakes, cat-rigged, R. M. 198
- Shola float, Or. 272
- Shrimp boat, U. S. A., after Chinese, R. M. 200
- Skiff, Sweden, "eka", R. M. 244
- Skipjack, U. S. A., New England, B. M. 203
- Sloop, U. S. A., Connecticut, Noank, welled, R. M. 180
  - Florida, *Terror*, R. M. 188
    - R. M. 182, 200

Page.

- Sloop, U. S A., Maine, Matinicus Islands, R. M. 182
  - Muscongus Bay, welled, R. M. 181
  - Menhaden carry-away, B. M. 196
    - R. M. 176
  - Welled, *Jeff Brown*, B. M. 189
    - *Manhattan*, B. M. 176
      - R. M. 178
  - Yacht, R. M. 110
- Smack, U. S. A., *City of Havana*, B. M. 169
  - *John W. Lowe*, R. M. 151
  - *Storm King*, R. M. 150
- Smackee, U. S. A., "Mudian" rig, *Jeff Brown*, R. M. 183
  - "Mudian" rig *Terror*, B. M. 188
- Sneak-box, U. S. A., R. M. 113
- Snow, U. S. A., Seventeenth Century, R. M. 120
- Spanish Fifteenth century sailing vessel, R. M. 69
- *Spencer F. Baird*, U. S. A., schooner, R. M. 143
- Steamship, U. S. A., *Albatross*, R. M. 42
  - *Alice M. Jacobs*, R. M. 119
  - *Cambrai*, 1920, R. M. 69
  - *Camille*, R. M. 118
  - *Clermont*, Robert Fulton's, 1807, R. M. 58
  - *Cuba*, 1875, R. M. 62
  - *Decatur*, B. M. 65
  - *Fish Hawk*, R. M. 43
  - *Golden Gate*, R. M. 116
  - *Grey Eagle*, Ohio River, R. M. 64
  - Great Lakes, R. M. 118
  - James Rumsey's, 1784, R. M. 47
  - *Jemima Boomer*, R. M. 118
  - *Jeremiah Swift*, R. M. 117
  - John Fitch's, 1786, R. M. 48
  - John Stevens', 1804, R. M. 49
  - *Meteor*, B. M. 66
  - *Novelty*, B. M. 119
  - *Ohio*, side-wheel steamboat, B. M. 66
  - *Orca*, whaler, R. M. 115
  - *Orleans*, Ohio River, R. M. 60
  - *Philadelphia*, 1889, R. M. 68
  - *Phœnix*, John Stevens', 1808, R. M. 59
  - *Royal*, schooner rig, R. M. 117
  - *Robert F. Stockton*, 1838; John Ericsson's screw propeller, R. M. 63
  - *Savannah*, 1819, R. M. 61
- Steam tugboat, U. S. A., *Atlantic*, B. M. 68
  - *Rattler*, R. M. 65
- Stevens', John, Iron screw propeller, model. 56
  - Marine engine and twin screws, Or. 50
  - steamboat, R. M. 49
- *St. Matthew*, clipper sailing packet, R. M. 73
- *Sunny South*, U. S. A., schooner, B. M. 176
- *Susan Center*, U. S. A., schooner, B. M. 158
- Surfboat, U. S. A., R. M. 196
- *Sylph*, U. S. A., schooner, R. M. 164
- *Telula*, U. S. A., brig, skeleton model 87

Page.

- *Terror*, U. S. A., sloop, B. M...... 188
- *Thomas E. Evans*, U. S. A., schooner, B. M.. 166
- *Tiger*, U. S. A., pinky schooner, R. M...... 133
- Tony, India dugout canoe, R. M...... 266
- *Trenton*, U. S. A., pinky schooner, B. M...... 157
- Vessel, Belgium, sloop, R. M...... 232
  - Denmark, cutter-rigged, R. M...... 233
    - sloop-rigged, R. M...... 234
  - Germany, Baltic Sea, smack, R. M.... 228
    - Island of Nordernei, R. M.. 227
    - "Kurran kahn," R. M...... 229
  - Greece, sloop-rigged, R. M...... 224
  - India, Bombay, "machva," lateen rig, R. M...... 264
    - Johore, "lanon," like prahu, R. M...... 255
      - lug-rigged, "penchalang," R. M...... 256
      - Rajah's, lug-rigged, "bidar," R. M...... 255
      - Rajah's, lug-rigged, "merak," R. M...... 256
    - yachtlike, two-mast, R. M... 256
  - Japan, single mast, lug-rigged, R. M. 274, 276
  - Java, lug-rigged, "champlong," R. M. 264
  - Laccadive Islands, lateen rig, R. M. 267, 268
  - Malay, lug-rigged, R. M...... 259
      - "ketam batu," R. M...... 261
    - Pirates, "prahu," R. M...... 250, 251
  - Netherlands, "bombschuite," R. M.. 230
  - North Celebes, lug-rigged, "pediwak," R. M...... 263
  - Norway, fishing, R. M...... 238
    - Ketch-rigged, "bankskiote," R. M...... 236
    - Lug-rigged, R. M...... 239, 240
    - Sloop-rigged, R. M...... 237
  - Sumatra, Like prahu, "bajak" by Dyak tribes, R. M...... 253
    - Like prahu, "lanchang," R. M...... 254

Page.

- Vessels, Sweden, Ketch-rigged, "bankskuta," R. M...... 241
  - Schooner-rigged, R. M...... 242
  - Sprit-sail rigged, R. M...... 243
  - Yawl-rigged, R. M...... 241, 243
- Viking ship, Norway, R. M...... 235
- *Wakeag*, U. S. A., schooner, B. M...... 96
- *Watchman*, U. S. A., schooner, B. M...... 95
- *Watson*, U. S. A., brig, B. M...... 87
- *Webster Sanborn*, U. S. A., schooner, B. M.... 169
- Welled schooner, U. S. A., B. M...... 171, 172
- *We're Here*, U. S. A., schooner, B. M...... 162
- *W. F. McKewen*, U. S. A., pungy, R. M.... 152
- Whaleboat, U. S. A., single mast, R. M...... 191
- Whaler, U. S. A., *Cornelius Howland*, bark, B. M...... 125
  - *Jireh Swift*, bark, B. M.... 124
  - *Nautilus*, bark, B. M...... 123
  - *Onward*, bark, B. M...... 123
  - *Orca*, steamship, R. M.... 115
  - *Reindeer*, bark, B. M...... 124
- Whitehall boat, U. S. A., rowboat, R. M.... 113
- *William C. French*, U. S. A., schooner, R. M.. 95
- *William Frederic*, U. S. A., schooner, three-mast, B. M...... 94
- *William H. Archer*, U. S. A., schooner, B. M.. 100
- *William M. Gaffney*, U. S. A., schooner, R. M. 142
- *William Schroeder*, U. S. A., bark, B. M..... 79
- Yacht, Canada, brig, B. M...... 109
  - English, *John Bull*, cutter, R. M...... 111
  - U. S. A., *Adelita*, steam, B. M...... 106
    - *Coquette*, schooner, B. M.... 108
    - *Olata*, schooner, B. M...... 109
    - *Princess*, steam, B. M...... 107
    - Schooner, B. M...... 110
      - R. M...... 110
    - Sloop, R. M...... 110
    - Steam, B. M...... 107
- Yawl, U. S. A., R. M...... 189
- *Young America*, U. S. A., clipper sailing ship, B. M...... 77

ADDITIONAL COPIES
OF THIS PUBLICATION MAY BE PROCURED FROM
THE SUPERINTENDENT OF DOCUMENTS
GOVERNMENT PRINTING OFFICE
WASHINGTON, D. C.
AT
40 CENTS PER COPY

PURCHASER AGREES NOT TO RESELL OR DISTRIBUTE THIS
COPY FOR PROFIT.—PUB. RES. 57, APPROVED MAY 11, 1922

▽

SMITHSONIAN INSTITUTION LIBRARIES
3 9088 01421 1957